

STN Search**11/518,072**

FILE 'HOME' ENTERED AT 19:17:19 ON 05 FEB 2010

=> s insect and acetylcholinesterase

L1	327	FILE	MEDLINE
L2	599	FILE	CAPLUS
L3	345	FILE	SCISEARCH
L4	269	FILE	LIFESCI
L5	1391	FILE	BIOSIS
L6	212	FILE	EMBASE

TOTAL FOR ALL FILES

L7 3143 INSECT AND ACETYLCHOLINESTERASE

=> s l7 and (culicidae or culex or aedes or anopheles)

L8	67	FILE	MEDLINE
L9	54	FILE	CAPLUS
L10	62	FILE	SCISEARCH
L11	40	FILE	LIFESCI
L12	194	FILE	BIOSIS
L13	18	FILE	EMBASE

TOTAL FOR ALL FILES

L14 435 L7 AND (CULICIDAE OR CULEX OR AEDES OR ANOPHELES)

=> s l14 and (insecticides or organophosphorus or carbamate)

L15	51	FILE	MEDLINE
L16	40	FILE	CAPLUS
L17	39	FILE	SCISEARCH
L18	32	FILE	LIFESCI
L19	113	FILE	BIOSIS
L20	12	FILE	EMBASE

TOTAL FOR ALL FILES

L21 287 L14 AND (INSECTICIDES OR ORGANOPHOSPHORUS OR CARBAMATE)

=> dup rem l21

PROCESSING COMPLETED FOR L21

L22 180 DUP REM L21 (107 DUPLICATES REMOVED)

=> s l22 not 2003-2010/py

L23	51	S	L22
L24	20	FILE	MEDLINE
L25	27	S	L22
L26	12	FILE	CAPLUS
L27	22	S	L22
L28	14	FILE	SCISEARCH
L29	9	S	L22
L30	7	FILE	LIFESCI
L31	69	S	L22
L32	46	FILE	BIOSIS
L33	2	S	L22
L34	1	FILE	EMBASE

TOTAL FOR ALL FILES

L35 100 L22 NOT 2003-2010/PY

=> s l21 not 2003-2010/py

L36 20 FILE MEDLINE

L37 19 FILE CAPLUS
L38 22 FILE SCISEARCH
L39 14 FILE LIFESCI
L40 69 FILE BIOSIS
L41 5 FILE EMBASE

TOTAL FOR ALL FILES

L42 149 L21 NOT 2003-2010/PY

=> dup rem l42

PROCESSING COMPLETED FOR L42

L43 100 DUP REM L42 (49 DUPLICATES REMOVED)

=> d ibib abs 1-100

L43 ANSWER 1 OF 100 MEDLINE on STN DUPLICATE 1

ACCESSION NUMBER: 2002638374 MEDLINE Full-text

DOCUMENT NUMBER: PubMed ID: 12396499

TITLE: A novel acetylcholinesterase gene in mosquitoes codes for the insecticide target and is non-homologous to the ace gene in Drosophila.

AUTHOR: Weill Mylene; Fort Philippe; Berthomieu Arnaud; Dubois Marie Pierre; Pasteur Nicole; Raymond Michel

CORPORATE SOURCE: Institut des Sciences de l'Evolution (UMR 5554), CC 065, Universite Montpellier II, F-34095 Montpellier cedex 05, France.. weill@isem.univ-montp2.fr

SOURCE: Proceedings. Biological sciences / The Royal Society, (2002 Oct 7) Vol. 269, No. 1504, pp. 2007-16.
Journal code: 101245157. ISSN: 0962-8452.
Report No.: NLM-PMC1691131.

PUB. COUNTRY: England: United Kingdom

DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
(RESEARCH SUPPORT, NON-U.S. GOV'T)

LANGUAGE: English

FILE SEGMENT: Priority Journals

ENTRY MONTH: 200304

ENTRY DATE: Entered STN: 26 Oct 2002

Last Updated on STN: 18 Apr 2003

Entered Medline: 17 Apr 2003

AB Acetylcholinesterase (AChE) is the target of two major insecticide families, organophosphates (OPs) and carbamates. AChE insensitivity is a frequent resistance mechanism in insects and responsible mutations in the ace gene were identified in two Diptera, *Drosophila melanogaster* and *Musca domestica*. However, for other insects, the ace gene cloned by homology with *Drosophila* does not code for the insensitive AChE in resistant individuals, indicating the existence of a second ace locus. We identified two AChE loci in the genome of *Anopheles gambiae*, one (ace-1) being a new locus and the other (ace-2) being homologous to the gene previously described in *Drosophila*. The gene ace-1 has no obvious homologue in the *Drosophila* genome and was found in 15 mosquito species investigated. In *An. gambiae*, ace-1 and ace-2 display 53% similarity at the amino acid level and an overall phylogeny indicates that they probably diverged before the differentiation of insects. Thus, both genes are likely to be present in the majority of insects and the absence of ace-1 in *Drosophila* is probably due to a secondary loss. In one mosquito (*Culex pipiens*), ace-1 was found to be tightly linked with insecticide resistance and probably encodes the AChE OP target. These results have important implications for the design of new insecticides, as the target AChE is thus encoded by distinct genes in different insect groups, even within the Diptera: ace-2 in at least the Drosophilidae and Muscidae and ace-1 in at

least the Culicidae. Evolutionary scenarios leading to such a peculiar situation are discussed.

L43 ANSWER 2 OF 100 LIFESCI COPYRIGHT 2010 CSA on STN

ACCESSION NUMBER: 2003:57859 LIFESCI Full-text

TITLE: Esterases as biomarkers in *Nereis* (*Hediste*) *diversicolor* exposed to temephos and *Bacillus thuringiensis* var. *israelensis* used for mosquito control in coastal wetlands of Morbihan (Brittany, France)

AUTHOR: Fourcy, D.; Jumel, A.; Heydorff, M.; Lagadic, L.

CORPORATE SOURCE: INRA, Station Commune de Recherche en Ichtyophysiologie, Biodiversite et Environnement (SCRIBE) Campus de Beaulieu, F-35042 Rennes Cedex, France; E-mail: lagadic@beaulieu.rennes.inra.fr

SOURCE: Marine Environmental Research [Mar. Environ. Res.], (2002) vol. 54, no. 3-5, pp. 755-759. ISSN: 0141-1136.

DOCUMENT TYPE: Journal

FILE SEGMENT: A

LANGUAGE: English

SUMMARY LANGUAGE: English

AB Since 1998, a biomonitoring programme has been implemented to assess the potential impact of chemical mosquito control on macroinvertebrates of the coastal wetlands of Morbihan (Brittany, France). Acetylcholinesterase and carboxylesterases were used as biomarkers to assess the effects of Abate registered 500e (a.i. temephos) and Vectobac registered 12 AS (a.i. endotoxins of *Bacillus thuringiensis* var. *israelensis*, Bti) in *Nereis* (*Hediste*) *diversicolor*. Esterase inhibition revealed a marked impact of temephos, suggesting preferential contamination of the worms through the food. In Bti-exposed *N. diversicolor*, random variations of esterase activities were observed, that could not be attributed to the larvicide. However, esterases only reflected indirect physiological effects of Bti, and further investigations are needed to identify biomarkers more specific of Bti endotoxins.

L43 ANSWER 3 OF 100 BIOSIS COPYRIGHT (c) 2010 The Thomson Corporation on STN

ACCESSION NUMBER: 2002:593264 BIOSIS Full-text

DOCUMENT NUMBER: PREV200200593264

TITLE: Insecticide susceptibility in the South African malaria mosquito *Anopheles arabiensis* (Diptera: Culicidae).

AUTHOR(S): Gericke, A.; Govere, J. M. [Reprint author]; Durrheim, D. N.

CORPORATE SOURCE: Communicable Disease Control, Mpumalanga Department of Health, Private Bag X11285, Nelspruit, 1200, South Africa johng@social.mpu.gov.za

SOURCE: South African Journal of Science, (March-April, 2002) Vol. 98, No. 3-4, pp. 205-208. print. CODEN: SAJSAR. ISSN: 0038-2353.

DOCUMENT TYPE: Article

LANGUAGE: English

ENTRY DATE: Entered STN: 20 Nov 2002

Last Updated on STN: 20 Nov 2002

AB Despite a century of insecticide use in agriculture and public health in South Africa, no insecticide susceptibility data exist for the malaria mosquito *Anopheles arabiensis* in South Africa. Biochemical assays and insecticide susceptibility tests were used to provide baseline data on DDT, deltamethrin,

fenitrothion and propoxur susceptibility in field populations of *An. arabiensis* sampled from three areas, Mamfene, Thomo and Malahlapanga, South Africa, from March to May 1996. Mamfene and Thomo had been exposed for decades to heavy insecticide use for agricultural purposes and for malaria vector control, respectively. Malahlapanga had not been exposed to insecticide use and acted as a control. Mosquitoes from the three areas demonstrated complete susceptibility on standard testing, except for those from Thomo, which showed 75.1% mortality on one-hour exposure to 0.1% propoxur. The results of the biochemical assays showed no elevation of enzyme levels/activity for acetylcholinesterase, non-specific esterases or glutathion-s-transferase. Sensitivity to all the insecticides suggested no heterogeneity within the mosquito populations. This study provides the first insecticide susceptibility and biochemical data for *An. arabiensis* in South Africa and should serve as the baseline against which to compare chemical resistance when choosing insecticides for malaria vector control.

L43 ANSWER 4 OF 100 MEDLINE on STN DUPLICATE 2

ACCESSION NUMBER: 2002208786 MEDLINE Full-text
 DOCUMENT NUMBER: PubMed ID: 11942747
 TITLE: Linkage analysis of an acetylcholinesterase gene
 in the house fly *Musca domestica* (Diptera: Muscidae).
 AUTHOR: Kozaki Oshinori; Shono Toshio; Tomita Takashi; Taylor
 Demar; Kono Yoshiaki
 CORPORATE SOURCE: Institute of Agriculture and Forestry, University of
 Tsukuba, Ibaraki, Japan.
 SOURCE: Journal of economic entomology, (2002 Feb) Vol. 95, No. 1,
 pp. 129-33.
 Journal code: 2985127R. ISSN: 0022-0493. L-ISSN: 0022-0493.
 PUB. COUNTRY: United States
 DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
 LANGUAGE: English
 FILE SEGMENT: Priority Journals
 OTHER SOURCE: GENBANK-AF281161; GENBANK-AF281165
 ENTRY MONTH: 200205
 ENTRY DATE: Entered STN: 12 Apr 2002
 Last Updated on STN: 14 May 2002
 Entered Medline: 13 May 2002

AB Linkage of an acetylcholinesterase (AChE) gene was detected in the house fly, *Musca domestica* L., by using the backcross method between a strain, aabys, that had a morphological multichromosomal marker on each of the five autosomes and a wild strain, LPR. Both strains were homozygous in this gene, and we used eight single nucleotide polymorphisms (SNPs) between them to distinguish the parental sequences in the backcrossed progeny, two of which resulted in the amino acid substitutions common to the *Drosophila* and *Aedes* AChEs insensitive to organophosphates and carbamates. F₁ appeared to be a wild phenotype, and the AChE gene was heterozygous of aabys and LPR. In the backcross progeny, 32 (2(5)) phenotypes appeared, and 10 phenotypes with one wild or morphological marker were picked up for genotyping by the SNPs of AChE gene. A combination of the morphological markers and the SNPs revealed that the AChE structural gene is linked to autosome 2 in the house fly.

L43 ANSWER 5 OF 100 BIOSIS COPYRIGHT (c) 2010 The Thomson Corporation on STN

ACCESSION NUMBER: 2002:571501 BIOSIS Full-text
 DOCUMENT NUMBER: PREV200200571501
 TITLE: How many genes encode cholinesterase in arthropods?.
 AUTHOR(S): Villatte, Francois [Reprint author]; Bachmann, Till T.
 CORPORATE SOURCE: Institute for Technical Biochemistry, Stuttgart University,

Allmandring 31, 70569, Stuttgart, Germany
 itbfvi@po.uni-stuttgart.de
SOURCE: Pesticide Biochemistry and Physiology, (June, 2002) Vol.
 73, No. 2, pp. 122-129. print.
 CODEN: PCBPBS. ISSN: 0048-3575.
DOCUMENT TYPE: Article
 General Review; (Literature Review)
LANGUAGE: English
ENTRY DATE: Entered STN: 7 Nov 2002
 Last Updated on STN: 7 Nov 2002
AB Carbamate and organophosphate pesticides act by inhibiting the key enzyme
 acetylcholinesterase in arthropods. Conversely to the case in vertebrates, in
 which two genes encode two different cholinesterases (ChE) a single gene was
 found in the fruit fly *Drosophila melanogaster*. In this species, several
 mutations decreasing the enzyme sensitivity to insecticides and thus
 responsible for resistance have been identified. After the sequencing of ChE-
 like genes in other species, repeated attempts to identify resistance
 mutations failed. These intriguing results raise the question of the
 existence of several ChE-encoding genes in a Arthropoda.

L43 ANSWER 6 OF 100 CAPLUS COPYRIGHT 2010 ACS on STN DUPLICATE 3

ACCESSION NUMBER: 2002:215405 CAPLUS Full-text
DOCUMENT NUMBER: 137:258155
TITLE: Cloning and sequence analysis of a cDNA fragment
 encoding acetylcholinesterase in cotton
 bollworm (*Helicoverpa armigera*)
AUTHOR(S): Ren, Xiaoxia; Han, Zhaojun; Wang, Yinchang
CORPORATE SOURCE: Key Lab of Monitoring and Management of Plant Disease
 and Insects, Ministry of Agriculture, Nanjing
 Agricultural University, Nanjing, 210095, Peop. Rep.
 China
SOURCE: Dongwu Xuebao (2002), 48(1), 121-124
 CODEN: TWHPA3; ISSN: 0001-7302
PUBLISHER: Kexue Chubanshe
DOCUMENT TYPE: Journal
LANGUAGE: Chinese
AB Acetylcholinesterase (AChE) is the target of organophosphate and carbamate
 pesticides. Organophosphate resistance is world-spread in the cotton bollworm
 [*Helicoverpa armigera* (Hvbner)]. With the degenerate primers we amplified a
 281 bp cDNA fragment of acetylcholinesterase (AChE) gene in *H. armigera* by
 reverse transcription-polymerase chain reaction (RT-PCR) method using total
 RNA extracted from 4th larva as the template. The cDNA fragment was inserted
 into pGEMT vector and then cloned. The deduced amino acid sequence of AChE
 consisted of 94 residues. The sequence anal. indicated that the deduced amino
 acid sequence of the cDNA fragment shares high identity with AChE gene from
 other published insects and animals. The acquired sequence had 84%, 79%, 74%,
 70%, 72%, 68%, 61%, 55% and 57% of amino acid residues identical to those of
 Leptinotarsa decemlineata, Nephotettix cincticeps, Anopheles stephensi, Aedes
 aegypti, Lucilia cuprina, Drosophila melanogaster, Musca domestica,
 Meloidogyne incognita, Torpedo californica, and Gallus gallus, resp. All
 these results firmly established that the amplified cDNA fragment was the
 partial sequence of ACnE in *H. armigera*.

L43 ANSWER 7 OF 100 SCISEARCH COPYRIGHT (c) 2010 The Thomson Corporation on
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ACCESSION NUMBER: 2001:821951 SCISEARCH Full-text
THE GENUINE ARTICLE: 481TQ
TITLE: Identification and characterization of mutations in

housefly (*Musca domestica*) acetylcholinesterase
involved in insecticide resistance

AUTHOR: Williamson M S (Reprint)

CORPORATE SOURCE: ICAR Rothamsted, Biol & Ecol Chem Dept, Harpenden AL5 2JQ,
Herts, England (Reprint)

AUTHOR: Walsh S B; Dolden T A; Moores G D; Kristensen M; Lewis T;
Devonshire A L

CORPORATE SOURCE: Danish Pest Infestat Lab, DK-2800 Lyngby, Denmark; Zeneca
Agrochem, Jealotts Hill Res Stn, Bracknell RG42 6ET,
Berks, England

COUNTRY OF AUTHOR: England; Denmark

SOURCE: BIOCHEMICAL JOURNAL, (1 OCT 2001) Vol. 359, Part 1, pp.
175-181.
ISSN: 0264-6021.

PUBLISHER: PORTLAND PRESS, 59 PORTLAND PLACE, LONDON W1N 3AJ, ENGLAND

DOCUMENT TYPE: Article; Journal

LANGUAGE: English

REFERENCE COUNT: 36

ENTRY DATE: Entered STN: 26 Oct 2001
Last Updated on STN: 26 Oct 2001

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB Acetylcholinesterase (AChE) insensitive to organophosphate and carbamate
insecticides has been identified as a major resistance mechanism in
numerous arthropod species. However, the associated genetic changes
have been reported in the AChE genes from only three insect species:
their role in conferring insecticide insensitivity has been confirmed.
using functional expression. only for those in *Drosophila melanogaster*.
The housefly. *Musca domestica*, was one of the first insects shown to
have this mechanism, here we report the occurrence of five mutations
(Val-180 --> Leu, Gly-262 --> Ala, Gly-262 --> Val, Phe-327 --> Tyr and
Gly-365 --> Ala) in the AChE gene of this species that, either singly or
in combination, confer different spectra of insecticide resistance. The
baculovirus expression of wild-type and mutated housefly AChE proteins
has confirmed that the mutations each confer relatively modest levels of
insecticide insensitivity except the novel Gly-262 --> Val mutation,
which results in much stronger resistance (up to 100-fold) to certain
compounds. In all cases the effects of mutation combinations are
additive. The mutations introduce amino acid substitutions that are
larger than the corresponding wild-type residues and are located within
the active site of the enzyme, close to the catalytic triad. The likely
influence of these substitutions on the accessibility of the different
types of inhibitor and the orientation of key catalytic residues are
discussed in the light of the three-dimensional structures of the AChE
protein from *Torpedo californica* and *D. melanogaster*.

L43 ANSWER 8 OF 100 SCISEARCH COPYRIGHT (c) 2010 The Thomson Corporation on
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ACCESSION NUMBER: 2001:875113 SCISEARCH Full-text

THE GENUINE ARTICLE: 487DJ

TITLE: Altered acetylcholinesterase confers
organophosphate resistance in the olive fruit fly
Bactrocera oleae

AUTHOR: Vontas J G (Reprint)

CORPORATE SOURCE: Cardiff Univ, Cardiff Sch Biosci, Cardiff CF10 3TL, S
Glam, Wales (Reprint)

AUTHOR: Cosmidis N; Loukas M; Tsakas S; Hejazi M J; Ayoutanti A;
Hemingway J

CORPORATE SOURCE: Agr Univ Athens, Dept Genet, Athens, Greece; Univ Tabriz,

Coll Agr, Dept Plant Protect, Tabriz, Iran
 COUNTRY OF AUTHOR: Wales; Greece; Iran
 SOURCE: PESTICIDE BIOCHEMISTRY AND PHYSIOLOGY, (OCT 2001) Vol. 71,
 No. 2, pp. 124-132.
 ISSN: 0048-3575.
 PUBLISHER: ACADEMIC PRESS INC, 525 B ST, STE 1900, SAN DIEGO, CA
 92101-4495 USA.
 DOCUMENT TYPE: Article; Journal
 LANGUAGE: English
 REFERENCE COUNT: 39
 ENTRY DATE: Entered STN: 9 Nov 2001
 Last Updated on STN: 9 Nov 2001

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB An organophosphate-resistant strain of the olive fruit fly *Bactrocera oleae*, the most important pest for olive orchards worldwide, was obtained by laboratory selection with dimethoate. Resistance mechanisms were investigated in comparison with the colonized parental strain and a field population collected from the same area after 12 years of continuous dimethoate-based insecticide pressure. Combined biochemical and bioassay data suggested that, although esterase and/or glutathione S-transferase metabolic pathways were present and active against dimethoate, they were not selected for and did not have a major role in resistance. There was no evidence of increased oxidase activity in the resistant strains or significant synergism of dimethoate toxicity by piperonyl butoxide; thus, oxidative metabolism was not a major component of resistance. An altered acetylcholinesterase (AChE) with poorer catalytic efficiency for the substrate acetylthiocholine iodide and 5- to 16-fold lower sensitivity to inhibition by omethoate was the major resistance mechanism. Dimethoate selected the insensitive AChE allele(s) in the resistant insects, which were also insensitive to paraoxon, but the altered AChE mechanism conferred negative cross-resistance to the carbamate propoxur. (C) 2001 Academic Press.

L43 ANSWER 9 OF 100 MEDLINE on STN DUPLICATE 4
 ACCESSION NUMBER: 2001105003 MEDLINE Full-text
 DOCUMENT NUMBER: PubMed ID: 11129708
 TITLE: Insecticide resistance spectra and resistance mechanisms in populations of Japanese encephalitis vector mosquitoes, *Culex tritaeniorhynchus* and *Cx. gelidus*, in Sri Lanka.
 AUTHOR: Karunaratne S H; Hemingway J
 CORPORATE SOURCE: Department of Zoology, Faculty of Science, University of Peradeniya, Sri Lanka.
 SOURCE: Medical and veterinary entomology, (2000 Dec) Vol. 14, No. 4, pp. 430-6.
 Journal code: 8708682. ISSN: 0269-283X. L-ISSN: 0269-283X.
 PUB. COUNTRY: England: United Kingdom
 DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
 (RESEARCH SUPPORT, NON-U.S. GOV'T)
 LANGUAGE: English
 FILE SEGMENT: Priority Journals
 ENTRY MONTH: 200102
 ENTRY DATE: Entered STN: 22 Mar 2001
 Last Updated on STN: 22 Mar 2001
 Entered Medline: 8 Feb 2001

AB *Culex tritaeniorhynchus* Giles and *Cx. gelidus* Theobald (Diptera: Culicidae), both vectors of Japanese encephalitis, were collected in 1984 and 1998 from two disease endemic localities in Sri Lanka: Anaradhapura and Kandy. Using wild-caught adult mosquitoes from light traps, log dosage-probit mortality

curves for insecticide bioassays were obtained for three insecticides: malathion (organophosphate), propoxur (carbamate) and permethrin (pyrethroid). LD50 values showed that, in 1998, *Cx. tritaeniorhynchus* was ~100-fold more resistant to malathion and 10-fold more resistant to propoxur than was *Cx. gelidus*. This difference was attributed to *Cx. tritaeniorhynchus* breeding mostly in irrigated rice paddy fields, where it would have been exposed to pesticide selection pressure, whereas *Cx. gelidus* breeds in other types of aquatic habitats less prone to pesticide applications. Resistance in *Cx. tritaeniorhynchus* increased between 1984 and 1998, whereas *Cx. gelidus* remained predominantly susceptible. Propoxur inhibition of acetylcholinesterase (AChE) activity (the target site of organophosphates and carbamates) indicated that in 1998, frequencies of insensitive AChE-based resistance were 9% in *Cx. gelidus* and 2-23% in *Cx. tritaeniorhynchus*, whereas in 1984 this resistance mechanism was detected only in 2% of the latter species from Anaradhapura. The AChE inhibition coefficient (k_i) with propoxur was $1.86 \pm 0.24 \times 10^{-5} \text{ M}^{-1} \text{ min}^{-1}$ for *Cx. tritaeniorhynchus* from Anaradhapura in 1998. Both species were tested for activity levels of detoxifying glutathione S-transferases (GSTs) and malathion-specific as well as general carboxylesterases. High activities of GSTs and carboxylesterases were detected in *Cx. tritaeniorhynchus* but not *Cx. gelidus*. Malathion-specific carboxylesterase was absent from both species. Native polyacrylamide gel electrophoresis resolved two elevated general carboxylesterases, CtrEstbetal and CtrEstalpal, from *Cx. tritaeniorhynchus* and none from *Cx. gelidus*. CtrEstbetal was the most intensely staining band. Gel inhibition experiments showed that both elevated esterases were inhibited by organophosphates and carbamates but not by pyrethroids. The major elevated esterase CtrEstbetal was partially purified (15-fold) by sequential Q-Sepharose and phenyl Sepharose column chromatography. The bimolecular rate constant (k_a) and the deacylation rate constant (k_3) for the malaoxon/enzyme interaction were $9.9 \pm 1.1 \times 10^3 \text{ M}^{-1} \text{ min}^{-1}$ and $3.5 \pm 0.05 \times 10^{-4} \text{ M}^{-1} \text{ min}^{-1}$, respectively, demonstrating that the role of this enzyme in organophosphorus insecticide resistance is sequestration.

L43 ANSWER 10 OF 100 BIOSIS COPYRIGHT (c) 2010 The Thomson Corporation on STN

ACCESSION NUMBER: 2001:124722 BIOSIS Full-text

DOCUMENT NUMBER: PREV200100124722

TITLE: Insecticide susceptibility in *Anopheles pseudopunctipennis* from Colombia: Comparison between bioassays and biochemical assays.

AUTHOR(S): Ocampo, Clara B. [Reprint author]; Brogdon, William G.; Orrego, Carlos M.; Toro, Guisela; Montoya-Lerma, James

CORPORATE SOURCE: Department of Tropical Medicine, Tulane University, 1501 Canal Street, Fifth Floor, New Orleans, LA, 10112, USA

SOURCE: Journal of the American Mosquito Control Association, (December, 2000) Vol. 16, No. 4, pp. 331-338. print. CODEN: JAMAET. ISSN: 8756-971X.

DOCUMENT TYPE: Article

LANGUAGE: English

ENTRY DATE: Entered STN: 7 Mar 2001

Last Updated on STN: 15 Feb 2002

AB *Anopheles pseudopunctipennis*, one of the primary vectors of malaria in the southwest of Colombia, was evaluated for susceptibility to the 3 major insecticide groups (organophosphates, pyrethroids, and carbamates) by bioassay and biochemical assay. Larval populations, which were collected principally from irrigation channels in agricultural areas, where the intensity of insecticide use varied, were utilized to establish susceptibility for the 1st time in this species. The baselines for each population showed a range of biological susceptibility to the insecticides evaluated, but overall no

resistance was detected according to standards established by the World Health Organization. The high sensitivity of biochemical microassays enabled the detection of a small proportion of mosquitoes with higher levels of nonspecific esterases and mixed-function oxidases from 2 areas where agricultural application of organophosphate and pyrethroid insecticides had been heavy. These differences were not sufficient to affect susceptibility as measured by bioassay. No evidence of insensitive acetylcholinesterase was observed. Absence of resistance in areas that have experienced heavy insecticide application could be explained by genetic drift, by gene flow from areas without insecticide pressure, by manner of exposure to the insecticides, or by recent changes in agricultural activities that decreased insecticide use. Baseline values were established that serve as provisional susceptibility thresholds for applying simple Centers for Disease Control and Prevention biochemical assay and bioassay methods to larvae of this anopheline species.

L43 ANSWER 11 OF 100 MEDLINE on STN DUPLICATE 5

ACCESSION NUMBER: 2000234685 MEDLINE Full-text

DOCUMENT NUMBER: PubMed ID: 10774652

TITLE: Insecticide cross-resistance spectra and underlying resistance mechanisms of Sri Lankan anopheline vectors of malaria.

AUTHOR: Karunaratne S H

CORPORATE SOURCE: Department of Zoology, University of Peradeniya, Sri Lanka.. shppk@zoology.pdn.ac.lk

SOURCE: The Southeast Asian journal of tropical medicine and public health, (1999 Sep) Vol. 30, No. 3, pp. 460-9.
Journal code: 0266303. ISSN: 0125-1562. L-ISSN: 0125-1562.

PUB. COUNTRY: Thailand

DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
(RESEARCH SUPPORT, NON-U.S. GOV'T)

LANGUAGE: English

FILE SEGMENT: Priority Journals

ENTRY MONTH: 200006

ENTRY DATE: Entered STN: 16 Jun 2000

Last Updated on STN: 16 Jun 2000

Entered Medline: 8 Jun 2000

AB Present status of insecticide resistance was investigated in two major vectors of malaria; *An. culicifacies* and *An. subpictus*, collected from a high malaria transmission area in Sri Lanka during 1996/1998. Adult and larval bioassays were carried out to obtain log-probit mortality lines for malathion, propoxur, permethrin and chlorpyrifos. Respective LD50 values were 4.45%, 0.002%, 0.16% and 0.001% for *An. culicifacies* and 0.66%, 0.004%, 0.004% and 0.04% for *An. subpictus*. Adults were also tested for WHO standard discriminating dosages of malathion, propoxur, permethrin, DDT, cypermethrin, deltamethrin and lambda cyhalothrin. Both populations were highly resistant to DDT. *An. culicifacies* was more resistant to malathion and *An. subpictus* was more resistant to chlorpyrifos. About 25% of both populations were resistant to permethrin. *An. culicifacies* was susceptible to propoxur, deltamethrin and lambda cyhalothrin and *An. subpictus* to cypermethrin and lambda cyhalothrin. Adult mosquitos were individually tested for their insecticide detoxifying enzyme activities and altered target-site, acetylcholinesterase. High general esterase activity indicated the presence of amplified esterase genes in both populations. Native gel electrophoresis resolved one elevated esterase isoenzyme, with high affinity to organophosphates, from each species. Malathion carboxylesterase mechanism was present in both populations. Higher glutathione-S-transferase activity was marked in *An. subpictus*. Synergistic studies showed the possible involvement of monooxygenases in resistance in both species. Acetylcholinesterase activity of approximately 80% of both

populations was not inhibited by a standard dosage of propoxur. Low resistance to carbamates shows that the impact of agricultural pesticides is not significant in the development of resistance especially in *An. culicifacies*. Pyrethroids, other than permethrin, can be successfully used in vector control programs. Carbamates will be an alternative.

L43 ANSWER 12 OF 100 LIFESCI COPYRIGHT 2010 CSA on STN DUPLICATE 6

ACCESSION NUMBER: 2000:45539 LIFESCI Full-text

TITLE: Selection and characterization of temephos resistance in a population of *Aedes aegypti* from Tortola, British Virgin Islands

AUTHOR: Wirth, M.C.; Georgiou, G.P.

CORPORATE SOURCE: Department of Entomology, University of California, Riverside, CA 92521, USA

SOURCE: Journal of the American Mosquito Control Association [J. Am. Mosq. Control Assoc.], (19990900) vol. 15, no. 3, pp. 315-320.
ISSN: 8756-971X.

DOCUMENT TYPE: Journal

FILE SEGMENT: Z

LANGUAGE: English

SUMMARY LANGUAGE: English

AB A collection of *Aedes aegypti* from Tortola, British Virgin Islands, with a high level of temephos resistance (46.8-fold at the 95% lethal concentration [LC sub(95)]) was selected to higher resistance with temephos in the laboratory. After 13 generations of pressure, the temephos resistance ratio increased to 180.6 (LC sub(95)), whereas in the absence of selection pressure the resistance ratio declined to 8.5. Relatively low levels of resistance or cross-resistance to other organophosphate and carbamate insecticides, and a high level of resistance to the pyrethroid permethrin were also observed. Synergism tests implicated detoxifying esterases in temephos resistance and the presence of elevated esterase activity was confirmed by biochemical tests; however, no evidence was found of insensitive acetylcholinesterase. Mendelian crosses indicated that temephos resistance was inherited as a monofactorial trait. The presence of high levels of temephos and permethrin resistance in *Ae. Aegypti* has important implications for *Aedes* control programs.

L43 ANSWER 13 OF 100 BIOSIS COPYRIGHT (c) 2010 The Thomson Corporation on STN

ACCESSION NUMBER: 1999:522398 BIOSIS Full-text

DOCUMENT NUMBER: PREV199900522398

TITLE: Population genetics of insecticide resistance in the mosquito *Culex pipiens*.

AUTHOR(S): Chevillon, Christine [Reprint author]; Raymond, Michel; Guillemaud, Thomas; Lenormand, Thomas; Pasteur, Nicole
CORPORATE SOURCE: Genetique de l'Adaptation, Genetique and Environnement, Institut des Sciences de l'Evolution (UMR CNRS 5554), Universite Montpellier II, place E. Bataillon, F-34000, Montpellier, France

SOURCE: Biological Journal of the Linnean Society, (Sept.-Oct., 1999) Vol. 68, No. 1-2, pp. 147-157. print.
CODEN: BJLSBG. ISSN: 0024-4066.

DOCUMENT TYPE: Article

General Review; (Literature Review)

LANGUAGE: English

ENTRY DATE: Entered STN: 3 Dec 1999

Last Updated on STN: 3 Dec 1999

AB Thirty years of control of the mosquito *Culex pipiens* using organophosphate insecticides (OP) has selected for OP-resistance alleles on a world-wide scale. As reviewed here, studies at the levels of gene and population allow identification of the main forces driving this process of adaptation. Three loci are involved in OP-resistance in *C. pipiens*. For two of these, adaptive mutations were found to be rare events, such that the ubiquitous distribution of certain resistance alleles could only be explained as deriving from a single origin by mutation followed by extensive migration. Population structure analyses confirmed that long-distance migration is frequent. Thus, different resistance alleles could accumulate and compete within populations soon after their origin by mutation. The different selection pressures acting on these alleles, i.e. their selective advantage in the presence of OP and their disadvantage (resistance cost) in absence of OP, were also analysed. Substantial differences in resistance cost among alleles present within the Mediterranean area were discovered. Long-term surveys of Mediterranean populations confirmed the pivotal importance of resistance cost in shaping the evolution of this adaptive polymorphism. Some hypotheses on the functional links between the nature of the initial mutation events and the subsequent evolution of polymorphism are discussed.

L43 ANSWER 14 OF 100 BIOSIS COPYRIGHT (c) 2010 The Thomson Corporation on STN

ACCESSION NUMBER: 1999:105551 BIOSIS Full-text

DOCUMENT NUMBER: PREV199900105551

TITLE: Evaluation of insecticide resistance and biochemical mechanisms in a population of *Culex quinquefasciatus* (Diptera: Culicidae) from Sao Paulo, Brazil.

AUTHOR(S): Bracco, Jose Eduardo [Reprint author]; Barata, Jose Maria S.; Marinotti, Osvaldo

CORPORATE SOURCE: Lab. Bioquim. Biol. Mol. Vetores, Superintendencia Controle Endemias Estado Sao Paulo, Rua Paula Souza 166, 01027-000 Sao Paulo, SP, Brazil

SOURCE: Memorias do Instituto Oswaldo Cruz, (Jan.-Feb., 1999) Vol. 94, No. 1, pp. 115-120. print.
CODEN: MIOCAS. ISSN: 0074-0276.

DOCUMENT TYPE: Article

LANGUAGE: English

ENTRY DATE: Entered STN: 4 Mar 1999

Last Updated on STN: 4 Mar 1999

AB To establish an insecticidal resistance surveillance program, *Culex quinquefasciatus* mosquitoes from Sao Paulo, Brazil, were colonized (PIN95 strain) and analyzed for levels of resistance. The PIN95 strain showed low levels of resistance to organophosphates (malathion (3.3-fold), fenitrothion (11.2-fold)) and a carbamate (propoxur (3.0-fold)). We also observed an increase of 7.4 and 9.9 in alpha and beta esterase activities, respectively, when compared with the reference IAL strain. An alteration in the sensitivity of acetylcholinesterase to insecticide inhibition was also found in the PIN95 mosquitoes. The resistant allele (Ace.1R), however, was found at low frequencies (0.12) and does not play an important role in the described insecticide resistance. One year later, *Cx. quinquefasciatus* mosquitoes were collected (PIN96 strain) at the same site and compared to the PIN95 strain. The esterase activity patterns observed for the PIN96 strain were similar to those of the PIN95 mosquitoes. However, the occurrence of the Ace.1R allele was statistically higher in the PIN96 strain. The results show that esterase-based insecticide resistance was established in the PIN95 *Cx. quinquefasciatus* population and that an acetylcholinesterase based resistant mechanism has been selected for. A continuous monitoring of this phenomenon is fundamental for rational mosquito control and insecticide application programs.

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ACCESSION NUMBER: 1998:835699 SCISEARCH Full-text
THE GENUINE ARTICLE: 134RK
TITLE: An overview of the evolution of overproduced esterases in
the mosquito *Culex pipiens*
AUTHOR: Raymond M (Reprint)
CORPORATE SOURCE: Univ Montpellier 2, Inst Sci Evolut, Lab Genet & Environm
CC 065, CNRS, UMR 5554, F-34095 Montpellier, France
(Reprint)
AUTHOR: Chevillon C; Guillemaud T; Lenormand T; Pasteur N
COUNTRY OF AUTHOR: France
SOURCE: PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY OF LONDON
SERIES B-BIOLOGICAL SCIENCES, (29 OCT 1998) Vol. 353, No.
1376, pp. 1707-1711.
ISSN: 0962-8436.
PUBLISHER: ROYAL SOC LONDON, 6 CARLTON HOUSE TERRACE, LONDON SW1Y
5AG, ENGLAND.
DOCUMENT TYPE: Article; Journal
LANGUAGE: English
REFERENCE COUNT: 33
ENTRY DATE: Entered STN: 1998
Last Updated on STN: 1998

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB Insecticide resistance genes have developed in a wide variety of insects
in response to heavy chemical application. Few of these examples of
adaptation in response to rapid environmental change have been studied
both at the population level and at the gene level. One of these is the
evolution of the overproduced esterases that are involved in resistance
to organophosphate insecticides in the mosquito *Culex pipiens*. At the
gene level, two genetic mechanisms are involved in esterase
overproduction, namely gene amplification and gene regulation. At the
population level, the co-occurrence of the same amplified allele in
distinct geographic areas is best explained by the importance of passive
transportation at the worldwide scale. The long-term monitoring of a
population of mosquitoes in southern France has enabled a detailed study
to be made of the evolution of resistance genes on a local scale, and
has shown that a resistance gene with a lower cost has replaced a former
resistance allele with a higher cost.

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ACCESSION NUMBER: 1998:835696 SCISEARCH Full-text
THE GENUINE ARTICLE: 134RK
TITLE: Why are there so few resistance-associated mutations in
insecticide target genes?
AUTHOR: ffrench-Constant R H (Reprint)
CORPORATE SOURCE: Univ Wisconsin, Dept Entomol, 1630 Linden Dr, Madison, WI
53706 USA (Reprint)
AUTHOR: Pittendrigh B; Vaughan A; Anthony N
CORPORATE SOURCE: Univ Wisconsin, Dept Entomol, Madison, WI 53706 USA; Univ
Wisconsin, Ctr Neurosci, Russell Labs 237, Madison, WI
53706 USA
COUNTRY OF AUTHOR: USA
SOURCE: PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY OF LONDON
SERIES B-BIOLOGICAL SCIENCES, (29 OCT 1998) Vol. 353, No.
1376, pp. 1685-1693.

ISSN: 0962-8436.
PUBLISHER: ROYAL SOC LONDON, 6 CARLTON HOUSE TERRACE, LONDON SW1Y
5AG, ENGLAND.
DOCUMENT TYPE: Article; Journal
LANGUAGE: English
REFERENCE COUNT: 61
ENTRY DATE: Entered STN: 1998
Last Updated on STN: 1998

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB The genes encoding the three major targets of conventional insecticides are: Rdl, which encodes a gamma-aminobutyric acid receptor subunit (RDL); para, which encodes a voltage-gated sodium channel (PARA); and Ace, which encodes insect acetylcholinesterase (AChE). Interestingly despite the complexity of the encoded receptors or enzymes, very few amino acid residues are replaced in different resistant insects: one within RDL, two within PARA and three or more within AChE. Here we examine the possible reasons underlying this extreme conservation by looking at the aspects of receptor and/or enzyme function that may constrain replacements to such a limited number of residues.

L43 ANSWER 17 OF 100 SCISEARCH COPYRIGHT (c) 2010 The Thomson Corporation
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ACCESSION NUMBER: 1998:609183 SCISEARCH Full-text
THE GENUINE ARTICLE: 109YJ
TITLE: Purification and characterisation of an esterase involved
in resistance to organophosphorus
insecticides in the saw-toothed grain beetle,
Oryzaephilus surinamensis (Coleoptera : Silvanidae)
AUTHOR: Conyers C M (Reprint)
CORPORATE SOURCE: MAFF, Cent Sci Lab, York YO4 1LZ, N Yorkshire, England
(Reprint)
AUTHOR: MacNicol A D; Price N R
COUNTRY OF AUTHOR: England
SOURCE: INSECT BIOCHEMISTRY AND MOLECULAR BIOLOGY, (JUL 1998) Vol.
28, No. 7, pp. 435-448.
ISSN: 0965-1748.
PUBLISHER: PERGAMON-ELSEVIER SCIENCE LTD, THE BOULEVARD, LANGFORD
LANE, KIDLINGTON, OXFORD OX5 1GB, ENGLAND.
DOCUMENT TYPE: Article; Journal
LANGUAGE: English
REFERENCE COUNT: 56
ENTRY DATE: Entered STN: 1998
Last Updated on STN: 1998

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB Malathion and fenitrothion resistance in a multi- organophosphorus (OP)-
resistant strain (7012/1malRR) of the saw-toothed grain beetle
Oryzaephilus surinamensis was found to be due to elevated esterase
levels. There was no evidence of elevated glutathione S-transferase or
cytochrome P-450 levels in this strain, or presence of an insensitive
acetylcholinesterase (AChE). The most active and abundant esterase
isozyme was purified from the resistant strain and an OF-susceptible
strain. The enzyme in both strains was monomeric but apparent molecular
weights and N-terminal amino acid sequences were different. There was
no difference in K-m between enzymes from resistant and susceptible
insects using alpha-naphthyl acetate as substrate, but the V-max of the
enzyme from the resistant strain was 7-fold higher than that from the
susceptible strain. Both enzymes were competitively inhibited by OPs,
but the enzyme from the resistant strain had a 3-fold lower affinity for
malaoxon compared to that from the susceptible strain. We hypothesise

that the resistance in the 7012/1malRR strain is due to the presence of elevated levels of an esterase enzyme which apparently has reduced affinity for OPs and greater activity than the corresponding enzyme in the susceptible strain. Crown copyright (C) 1998 Published by Elsevier Science Ltd. All rights reserved.

L43 ANSWER 18 OF 100 MEDLINE on STN DUPLICATE 7
ACCESSION NUMBER: 1999183879 MEDLINE Full-text
DOCUMENT NUMBER: PubMed ID: 10084133
TITLE: Isolation and characterization of two novel organophosphate resistance mechanisms in *Culex pipiens* from Cyprus.
AUTHOR: Wirth M C
CORPORATE SOURCE: Department of Entomology, University of California, Riverside 92521, USA.
SOURCE: Journal of the American Mosquito Control Association, (1998 Dec) Vol. 14, No. 4, pp. 397-405.
Journal code: 8511299. ISSN: 8756-971X. L-ISSN: 8756-971X.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
(RESEARCH SUPPORT, NON-U.S. GOV'T)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199905
ENTRY DATE: Entered STN: 25 May 1999
Last Updated on STN: 25 May 1999
Entered Medline: 10 May 1999

AB Two novel mechanisms of organophosphate resistance were isolated and characterized from a population of *Culex pipiens* L. from Cyprus. Two strains, one expressing the novel, highly active esterases A5 and B5 (strain A5B5-R), and one expressing insensitive acetylcholinesterase (strain Ace-R), were developed by single pair crosses and selection with temephos and propoxur, respectively. The A5B5-R strain demonstrated resistance toward organophosphate insecticides that could be suppressed by the esterase inhibitor S,S,S-tributyl phosphorotrithioate (DEF). No cross-resistance to carbamates occurred. The Ace-R strain demonstrated resistance to organophosphate as well as to carbamate insecticides. Propoxur and temephos resistance was not affected by the monooxygenase inhibitor piperonyl butoxide or by DEF. The Ace-R strain possessed a novel toxicologic profile as well as a unique acetylcholinesterase inhibition pattern. Inheritance of temephos or propoxur resistance was codominant in F1 offspring. Backcrosses to a susceptible strain in both cases failed to fit a single gene model, suggesting that multiple loci may be involved. Combining the A5B5-R and the Ace-R strains resulted in high levels of temephos resistance, similar to that of the parents.

L43 ANSWER 19 OF 100 SCISEARCH COPYRIGHT (c) 2010 The Thomson Corporation on STN
ACCESSION NUMBER: 1999:87 SCISEARCH Full-text
THE GENUINE ARTICLE: 148RK
TITLE: Molecular basis of insecticide resistance
AUTHOR: Alzogaray R A
SOURCE: ACTA BIOQUIMICA CLINICA LATINOAMERICANA, (SEP 1998) Vol. 32, No. 3, pp. 387-+.
ISSN: 0325-2957.
PUBLISHER: FEDERACION BIOQUIMICA PROVINCIA BUENOS AIRES, CALLE 6, NO. 1344, 1900 LA PLATA, BUENOS AIRES, ARGENTINA.
DOCUMENT TYPE: Article; Journal

LANGUAGE: Spanish

REFERENCE COUNT: 36

ENTRY DATE: Entered STN: 1999

Last Updated on STN: 9 Jan 2009

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB Development of resistance in insect populations is among undesirable effects of the use of insecticides. It is a good example of the way in which microevolutive events occur. The first documented case of insecticide resistance in insects was in 1908. At the present more than 500 species of arthropods are known to have developed resistance to insecticides. Reduced cuticular penetration, enhanced metabolic degradation and reduced sensitivity of molecular targets are mechanisms conferring resistance to one or more insecticides. Today the methods of molecular biology allow to elucidate the molecular basis underlying the above mentioned mechanisms. The aim of the present article is to present the available knowledge about the molecular basis of insecticide resistance: point mutations in acetylcholinesterase (*Drosophila melanogaster*) and GABA receptor (several species) genes, insertions in transferase gene (*D. melanogaster*) and cytochrome P450 gene (*D. melanogaster*), amplification of esterase genes (*Myzus persicae* and *Culex pipiens* / *quinquefasciatus* complex), changes affecting the expression of cytochrome P450 gene (*Musca domestica*), and a mutation genetically linked to sodium channel gene (*M. domestica*).

L43 ANSWER 20 OF 100 MEDLINE on STN DUPLICATE 8

ACCESSION NUMBER: 1998277777 MEDLINE Full-text

DOCUMENT NUMBER: PubMed ID: 9615543

TITLE: Resistance to organophosphorus and pyrethroid insecticides in *Culex pipiens* (Diptera: Culicidae) from Tunisia.

AUTHOR: Ben Cheikh H; Ben Ali-Haouas Z; Marquine M; Pasteur N

CORPORATE SOURCE: Laboratoire de Genetique, Faculte de Medecine de Monastir, Universite du Centre, Tunisia.

SOURCE: Journal of medical entomology, (1998 May) Vol. 35, No. 3, pp. 251-60.

Journal code: 0375400. ISSN: 0022-2585. L-ISSN: 0022-2585.

PUB. COUNTRY: United States

DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
(RESEARCH SUPPORT, NON-U.S. GOV'T)

LANGUAGE: English

FILE SEGMENT: Priority Journals

ENTRY MONTH: 199806

ENTRY DATE: Entered STN: 13 Jul 1998

Last Updated on STN: 13 Jul 1998

Entered Medline: 30 Jun 1998

AB Resistance to the organophosphates temephos and chlorpyrifos, the carbamate propoxur, the pyrethroid permethrin, and the organochloride DDT was investigated in Tunisian populations of *Culex pipiens pipiens* (L.) collected between 1990 and 1996. Resistance to temephos was uniformly low, reaching 10-fold in the most resistant population. In contrast, resistance to chlorpyrifos was highly variable, reaching the highest level (> 10,000-fold) recorded worldwide. The chlorpyrifos-resistant populations also were highly resistant to propoxur. Some populations also showed high resistance to permethrin (up to 5,000-fold) and moderate resistance to DDT (approximately 20-fold). Bioassays conducted in the presence of synergists showed that increased detoxification had only a minor role in resistance, although several over-produced esterases known to be involved in organophosphate resistance were detected. To better understand the factors influencing the distribution of resistance in Tunisia, the polymorphism of genes involved in

organophosphate resistance (i.e., over-produced esterases and insensitive acetylcholinesterase) was investigated in relation to the genetic structure of populations studied by analyzing the electrophoretic polymorphism of "neutral" genes. Over the area studied, and despite a high level of gene flow, resistance genes showed a patchy distribution. Results are discussed in relation to the selection pressure caused by insecticide treatments.

L43 ANSWER 21 OF 100 MEDLINE on STN DUPLICATE 9
ACCESSION NUMBER: 1998407611 MEDLINE Full-text
DOCUMENT NUMBER: PubMed ID: 9737593
TITLE: Resistance management strategies in malaria vector mosquito control. Baseline data for a large-scale field trial against *Anopheles albimanus* in Mexico.
AUTHOR: Penilla R P; Rodriguez A D; Hemingway J; Torres J L; Arredondo-Jimenez J I; Rodriguez M H
CORPORATE SOURCE: Centro de Investigacion de Paludismo, Tapachula, Chiapas, Mexico.
SOURCE: Medical and veterinary entomology, (1998 Jul) Vol. 12, No. 3, pp. 217-33.
JOURNAL CODE: 8708682. ISSN: 0269-283X. L-ISSN: 0269-283X.
PUB. COUNTRY: ENGLAND: United Kingdom
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
(RESEARCH SUPPORT, NON-U.S. GOV'T)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199901
ENTRY DATE: Entered STN: 28 Jan 1999
Last Updated on STN: 28 Jan 1999
Entered Medline: 12 Jan 1999

AB A high level of DDT resistance and low levels of resistance to organophosphorus, carbamate and pyrethroid insecticides were detected by discriminating dose assays in field populations of *Anopheles albimanus* in Chiapas, southern Mexico, prior to a large-scale resistance management project described by Hemingway et al. (1997). Biochemical assays showed that the DDT resistance was caused by elevated levels of glutathione S-transferase (GST) activity leading to increased rates of metabolism of DDT to DDE. The numbers of individuals with elevated GST and DDT resistance were well correlated, suggesting that this is the only major DDT resistance mechanism in this population. The carbamate resistance in this population is conferred by an altered acetylcholinesterase (AChE)-based resistance mechanism. The level of resistance observed in the bioassays correlates with the frequency of individuals homozygous for the altered AChE allele. This suggests that the level of resistance conferred by this mechanism in its heterozygous state is below the level of detection by the WHO carbamate discriminating dosage bioassay. The low levels of organophosphate (OP) and pyrethroid resistance could be conferred by either the elevated esterase or monooxygenase enzymes. The esterases were elevated only with the substrate pNPA, and are unlikely to be causing broad spectrum OP resistance. The altered AChE mechanism may also be contributing to the OP but not the pyrethroid resistance. Significant differences in resistance gene frequencies were obtained from the F1 mosquitoes resulting from adults obtained by different collection methods. This may be caused by different insecticide selection pressures on the insects immediately prior to collection, or may be an indication that the indoor- and outdoor-resting *A. albimanus* collections are not from a randomly mating single population. The underlying genetic variability of the populations is currently being investigated by molecular methods.

on STN

ACCESSION NUMBER: 1998:938907 SCISEARCH Full-text
THE GENUINE ARTICLE: 146NB
TITLE: Duplication of the Rdl GABA receptor subunit gene in an
insecticide-resistant aphid, *Myzus persicae*
AUTHOR: Anthony N (Reprint)
CORPORATE SOURCE: Univ Wisconsin, Dept Entomol, Russell Labs 237, 1630
Linden Dr, Madison, WI 53706 USA (Reprint)
AUTHOR: Unruh T; Ganser D; ffrench-Constant R
CORPORATE SOURCE: Univ Wisconsin, Dept Entomol, Russell Labs 237, Madison,
WI 53706 USA; Univ Wisconsin, Ctr Neurosci, Russell Labs
237, Madison, WI 53706 USA; USDA, Yakima Agr Res Lab,
Wapato, WA 98951 USA
COUNTRY OF AUTHOR: USA
SOURCE: MOLECULAR AND GENERAL GENETICS, (NOV 1998) Vol. 260, No.
2-3, pp. 165-175.
ISSN: 0026-8925.
PUBLISHER: SPRINGER-VERLAG, 175 FIFTH AVE, NEW YORK, NY 10010 USA.
DOCUMENT TYPE: Article; Journal
LANGUAGE: English
REFERENCE COUNT: 63
ENTRY DATE: Entered STN: 1998
Last Updated on STN: 1998

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB Resistance to cyclodiene insecticides is associated with replacements of a single amino acid (alanine 302) in a gamma-aminobutyric acid (GABA) receptor subunit encoded by the single-copy gene Resistance to dieldrin (Rdl). Alanine 302 is predicted to reside within the second membrane-spanning region of the Rdl receptor, a region that is thought to line the integral chloride ion channel pore. In all cyclodiene-resistant insects studied to date, this same alanine residue is replaced either by a serine, or, in some resistant strains of *Drosophila simulans*, a glycine residue. Therefore, individuals can carry only two different Rdl alleles. In contrast, here we report the presence of up to four different Rdl-like alleles in individual clones of the green peach aphid, *Myzus persicae*. In addition to the wild-type copy of Rdl gene (encoding A302 or allele A), *M. persicae* carries three other alleles with the following amino acid replacements: A302 --> Glycine (allele G), A302 --> Serine(TCG) (allele S) and A302 --> Serine(AGT) (allele S'). Evidence from direct nucleotide sequencing and Single Stranded Conformational Polymorphism (SSCP) analysis shows that at least three of these different Rdl alleles (i.e. A, G and S) are commonly present in individual aphids or aphid clones. Southern analysis using allele-specific probes and analysis of sequences downstream of the exon containing the resistance-associated mutation confirm the presence of two independent Rdl-like loci in *M. persicae*. One locus carries the susceptible alanine (A) and/or resistant glycine (G) allele while the other carries the two serine alleles (S or S'). Whereas resistance levels are correlated with the glycine replacement, the S allele was present in all aphid clones, regardless of their resistance status. These results suggest that target site insensitivity is associated with replacements at the first (A/G) but not the second (S/S') locus. Phylogenetic analysis of nucleotide sequences indicates that both putative aphid Rdl loci are monophyletic with respect to other insect Rdl genes and may have arisen through a recent gene duplication event. The implications of this duplication with respect to insecticide resistance and insect GABA receptor subunit diversity are discussed.

ACCESSION NUMBER: 1998119513 MEDLINE Full-text
 DOCUMENT NUMBER: PubMed ID: 9459425
 TITLE: Analysis of a mosquito acetylcholinesterase gene promoter.
 AUTHOR: Liu H T; Stilwell G; Anthony N; Rocheleau T; ffrench-Constant R H
 CORPORATE SOURCE: Department of Entomology and Center for Neuroscience, University of Wisconsin-Madison 53706, USA.
 CONTRACT NUMBER: AI 28781 (United States NIAID NIH HHS)
 AI 35026 (United States NIAID NIH HHS)
 SOURCE: Insect molecular biology, (1998 Feb) Vol. 7, No. 1, pp. 11-7.
 Journal code: 9303579. ISSN: 0962-1075. L-ISSN: 0962-1075.
 PUB. COUNTRY: ENGLAND: United Kingdom
 DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
 (RESEARCH SUPPORT, U.S. GOV'T, P.H.S.)
 LANGUAGE: English
 FILE SEGMENT: Priority Journals
 ENTRY MONTH: 199803
 ENTRY DATE: Entered STN: 19 Mar 1998
 Last Updated on STN: 19 Mar 1998
 Entered Medline: 12 Mar 1998

AB Insect acetylcholinesterase is the target site for organophosphorus and carbamate insecticides and point mutations in the Ace gene are associated with resistance in *Drosophila melanogaster* and *Musca domestica*. However, little is known of the genetic regulation of insect Ace genes. Here we report the isolation of four different cDNAs from an *Aedes* Ace locus and identification of the gene promoter. Northern analysis reveals two large (>10 kb) transcripts and one smaller transcript of 4 kb. The region containing the initiation of transcription was localized by sequencing the two 5' most cDNAs and by 5' RACE. The transcription start point was subsequently identified by primer extension and is flanked by a perfect arthropod initiator consensus sequence. The promoter lacks a TATA box but contains several matches to other consensus sequences for eukaryotic transcription factors. In common with the *Drosophila* Ace gene, there are also multiple potential initiators of translation (ATGs) upstream of the main open reading frame. The structure of the 5' leader and promoter is compared to that found in other insect and vertebrate Ace genes and the possibility that this locus is homologous to one of two Ace loci described in another mosquito, *Culex pipiens*, is discussed.

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ACCESSION NUMBER: 1997:526650 SCISEARCH Full-text
 THE GENUINE ARTICLE: XJ876
 TITLE: A single amino acid substitution converts a carboxylesterase to an organophosphorus hydrolase and confers insecticide resistance on a blowfly
 AUTHOR: Newcomb R D (Reprint); Campbell P M; Ollis D L; Cheah E; Russell R J; Oakeshott J G
 CORPORATE SOURCE: CSIRO, DIV ENTOMOL, CANBERRA, ACT 2601, AUSTRALIA;
 AUSTRALIAN NATL UNIV, DIV BOT & ZOOL, CANBERRA, ACT 0200, AUSTRALIA;
 AUSTRALIAN NATL UNIV, RES SCH CHEM, CANBERRA, ACT 0200, AUSTRALIA
 COUNTRY OF AUTHOR: AUSTRALIA
 SOURCE: PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA, (8 JUL 1997) Vol. 94, No. 14, pp. 7464-7468.
 ISSN: 0027-8424.
 PUBLISHER: NATL ACAD SCIENCES, 2101 CONSTITUTION AVE NW, WASHINGTON,

DC 20418.
DOCUMENT TYPE: Article; Journal
FILE SEGMENT: LIFE
LANGUAGE: English
REFERENCE COUNT: 48
ENTRY DATE: Entered STN: 1997

Last Updated on STN: 1997

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB Resistance to organophosphorus (OP) insecticides is associated with decreased carboxylesterase activity in several insect species. It has been proposed that the resistance may be the result of a mutation in a carboxylesterase that simultaneously reduces its carboxylesterase activity and confers an OP hydrolase activity (the 'mutant aliesterase hypothesis'). In the sheep blowfly, *Lucilia cuprina*, the association is due to a change in a specific esterase isozyme, E3, which, in resistant flies, has a null phenotype on gels stained using standard carboxylesterase substrates. Here we show that an OP-resistant allele of the gene that encodes E3 differs at five amino acid replacement sites from a previously described OP-susceptible allele. Knowledge of the structure of a related enzyme (acetylcholinesterase) suggests that one of these substitutions (Gly(137)-->Asp) lies within the active site of the enzyme. The occurrence of this substitution is completely correlated with resistance across 15 isogenic strains. In vitro expression of two natural and two synthetic chimeric alleles shows that the Asp(137) substitution alone is responsible for both the loss of E3's carboxylesterase activity and the acquisition of a novel OP hydrolase activity. Modeling of Asp(137) in the homologous position in acetylcholinesterase suggests that Asp(137) may act as a base to orientate a water molecule in the appropriate position for hydrolysis of the phosphorylated enzyme intermediate.

L43 ANSWER 25 OF 100 BIOSIS COPYRIGHT (c) 2010 The Thomson Corporation on STN

ACCESSION NUMBER: 1998:76725 BIOSIS Full-text

DOCUMENT NUMBER: PREV199800076725

TITLE: Distribution of organophosphate and carbamate resistance in *Culex pipiens quinquefasciatus* (Diptera: Culicidae) in West Africa.

AUTHOR(S): Chandre, Fabrice [Reprint author]; Darriet, Frederic; Doannio, Julien M. C.; Riviere, Francois; Pasteur, Nicole; Guillet, Pierre

CORPORATE SOURCE: ORSTOM, Lab. Lutte contre les Insectes Nuisibles, BP 5045, 34032 Montpellier Cedex 1, France

SOURCE: Journal of Medical Entomology, (Nov., 1997) Vol. 34, No. 6, pp. 664-671. print.

CODEN: JMENA6. ISSN: 0022-2585.

DOCUMENT TYPE: Article

LANGUAGE: English

ENTRY DATE: Entered STN: 24 Feb 1998

Last Updated on STN: 24 Feb 1998

AB The distribution of organophosphate and carbamate resistance was investigated in 33 samples of *Culex pipiens quinquefasciatus* Say from 25 cities in Cote d'Ivoire and Burkina Faso. Organophosphate resistance levels were higher in Cote d'Ivoire than in Burkina Faso. Chlorpyrifos resistance ratios at LC95 ranged from 4 to 30 times in Cote d'Ivoire and from 3 to 6 times in Burkina Faso. For temephos, ratios ranged from 3 to 18 and from 1 to 2, respectively. Of 27 samples from Cote d'Ivoire, 25 also displayed cross resistance to carbamates as shown by a mortality plateau in bioassays with propoxur and carbosulfan (similar to chlorpyrifos). Cross resistance to organophosphates

and carbamates was caused by an insensitive acetylcholinesterase allele (Ace). This gene was absent from Burkina Faso, except in Niangoloko near the Cote d'Ivoire border. Organophosphate resistance also was associated with the presence of A2-B2 overproduced esterases which had higher frequencies in Cote d'Ivoire (75-100%) than in Burkina Faso (40-50%). Two other esterases with the same electrophoretic mobility as C2 from Puerto Rico and B1 from California were identified for the 1st time in West Africa. "C2" was widespread, whereas "B1" was present in only a few mosquitoes from Cote d'Ivoire. These differences in resistance patterns should be taken into consideration in planning urban mosquito control strategies within 2 countries.

L43 ANSWER 26 OF 100 BIOSIS COPYRIGHT (c) 2010 The Thomson Corporation on STN

ACCESSION NUMBER: 1998:47345 BIOSIS Full-text
DOCUMENT NUMBER: PREV199800047345
TITLE: Molecular mapping of insecticide resistance genes in the yellow fever mosquito (*Aedes aegypti*).
AUTHOR(S): Severson, D. W. [Reprint author]; Anthony, N. M.; Andreev, O.; Ffrench-Constant, R. H.
CORPORATE SOURCE: Dep. Biol. Sci., Univ. Notre Dame, Notre Dame, IN 46556, USA
SOURCE: Journal of Heredity, (Nov.-Dec., 1997) Vol. 88, No. 6, pp. 520-524. print.
CODEN: JOHEA8. ISSN: 0022-1503.
DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 27 Jan 1998
Last Updated on STN: 27 Jan 1998

AB Several loci conferring insecticide resistance in the yellow fever mosquito (*Aedes aegypti*) have previously been mapped by simple recombinational mapping. Here we describe correlation of these resistance phenotypes with molecular gene probes for insecticide target sites by RFLP mapping. The para sodium channel gene homologue and the GABA receptor gene Resistance to dieldrin map to the same genome regions as the DDT/pyrethroid and cyclodiene resistance loci, respectively. Although the acetylcholinesterase (target site of organophosphorus and carbamate insecticides) gene Ace does not map to any known resistance locus, it maps very close to the sex-determining locus. We discuss the possibilities that, if identified, Ace-mediated resistance in *A. aegypti* will be sex linked or that, as suggested for anopheline mosquitoes, two independent Ace loci may exist, one of which is autosomal. These results support the importance of target site insensitivity as an insecticide resistance mechanism in mosquitoes.

L43 ANSWER 27 OF 100 BIOSIS COPYRIGHT (c) 2010 The Thomson Corporation on STN

ACCESSION NUMBER: 1997:455150 BIOSIS Full-text
DOCUMENT NUMBER: PREV199799754353
TITLE: Examination of esterases from insecticide resistant and susceptible strains of the German cockroach, *Blattella germanica* (L.).
AUTHOR(S): Scharf, Michael E. [Reprint author]; Hemingway, Janet; Small, Graham J.; Bennett, Gary W.
CORPORATE SOURCE: Cent. Urban and Industrial Pest Management, Dep. Entomol., Purdue Univ., West Lafayette, IN 47907-1158, USA
SOURCE: Insect Biochemistry and Molecular Biology, (1997) Vol. 27, No. 6, pp. 489-497.
CODEN: IBMBES. ISSN: 0965-1748.

DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 27 Oct 1997
Last Updated on STN: 10 Dec 1997

AB Esterases from insecticide resistant and susceptible *Blattella germanica* (L.) were examined biochemically. Two strains were utilized: Johnson Wax (JWax; susceptible), and Munsyana (MA; chlorpyrifos LD-50 and LD-95 resistance ratio 5.2 and 10.0). On native polyacrylamide gel electrophoresis (PAGE), MA had four visible esterase electromorphs (E1, E2, E3 and E4), whereas JWax had three (E1, E2 and E4). Esterases E1 and E4 were more intense in the MA strain, and none of these esterase electromorphs were acetylcholinesterases. Insecticide inhibition of native esterases within polyacrylamide gels showed an interaction of all electromorphs with the carbamate insecticide propoxur and complete inhibition of all electromorphs by the carbamate bendiocarb and the organophosphate insecticides chlorpyrifos oxon, malaoxon and paraoxon. The pyrethroid insecticides permethrin and cypermethrin had no inhibitory effects. Sequential Q-Sepharose and hydroxyapatite column chromatography was used to fractionate esterases from each strain into two groups (I and II). Following hydroxyapatite fractionation of these esterase groups, inhibition kinetic constants (k_a and k_3), and molecular weights were estimated. Results for k_a (the rate of enzyme inhibition) indicated a greater affinity for organophosphate insecticides by MA esterases. Results for k_3 (the rate of enzyme recovery) indicated lengthened times of MA esterase-inhibition by organophosphate insecticides. Therefore the role, if any, in organophosphate resistance played by MA esterases must be by sequestration. Molecular weight estimates were within the range (55-65 kDa) previously observed for esterases from both *B. germanica* and *Culex quinquefasciatus*.

L43 ANSWER 28 OF 100 CAPLUS COPYRIGHT 2010 ACS on STN DUPLICATE 11

ACCESSION NUMBER: 1997:766706 CAPLUS Full-text

DOCUMENT NUMBER: 128:58555

ORIGINAL REFERENCE NO.: 128:11375a,11378a

TITLE: Resistance management strategies in malaria vector mosquito control. A large-scale field trial in southern Mexico

AUTHOR(S): Hemingway, Janet; Penilla, R. Patricia; Rodriguez, Americo D.; James, Brown M.; Edge, William; Rogers, Hilary; Rodriguez, Mario H.

CORPORATE SOURCE: Sch. Pure Applied Biol., Univ. Wales Cardiff, Cardiff, CF1 3TL, UK

SOURCE: Pesticide Science (1997), 51(3), 375-382

CODEN: PSSCBG; ISSN: 0031-613X

PUBLISHER: John Wiley & Sons Ltd.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A resistance management program comparing rotations, mosaics and single use of insecticides for residual house-spraying against the insect vectors of malaria is being carried out in Southern Mexico. The area was chosen because of its prior history of insecticide use, relatively sedentary vector, and phys. features of the area which limit inward migration of insects to the study area. A high level of resistance to DDT and low levels of organophosphorus (OP), carbamate and pyrethroid resistance were detected by WHO discriminating-dose assays in field populations of *Anopheles albimanus* in the pre-spray period in the region where this resistance management project is being undertaken. After the first year of spraying, resistance, as measured by a discriminating-dose assay, was still at a high level for DDT and had risen for all the other insecticides. Biochem. assays showed that DDT resistance was primarily caused by elevated levels of glutathione S-transferase (GST) activity leading to increased rates of metabolism of DDT to DDE. The nos. of individuals with elevated GST and DDT resistance were well correlated, suggesting

that this is the only major DDT resistance mechanism in this population. The carbamate resistance in this population was conferred by an altered acetylcholinesterase (AChE) mechanism. The level of resistance in bioassays correlated well with the frequency of individuals homozygous for the altered AChE allele. This suggests that the level of resistance conferred by this mechanism in its heterozygous state is below the level of detection of the bioassay. The low levels of OP and pyrethroid resistance could be conferred by either the elevated esterase or monooxygenase enzymes. The esterases, however, are elevated only with p-nitrophenyl acetate (PNPA), and are unlikely to be causing broad-spectrum OP resistance. The altered AChE mechanism may also be contributing to the OP but not the pyrethroid resistance. There were significant differences in some resistance gene frequencies for insects obtained by different indoor and outdoor trapping methods. To determine whether the different sampling methods were effectively sampling the same interbreeding population, RAPD anal. of insects obtained by different collection methods in different villages was undertaken. There was no observed variability in the RAPD patterns for the different mosquito samples with a number of primers. OS.CITING REF COUNT: 13 THERE ARE 13 CAPLUS RECORDS THAT CITE THIS

RECORD (13 CITINGS)

REFERENCE COUNT: 21 THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L43 ANSWER 29 OF 100 CAPLUS COPYRIGHT 2010 ACS on STN DUPLICATE 12

ACCESSION NUMBER: 1997:766452 CAPLUS Full-text

DOCUMENT NUMBER: 128:71956

ORIGINAL REFERENCE NO.: 128:13971a,13974a

TITLE: Interaction between acetylcholinesterase and choline acetyltransferase: an hypothesis to explain unusual toxicological responses

AUTHOR(S): Bourguet, Denis; Raymond, Michel; Berrada, Said; Fournier, Didier

CORPORATE SOURCE: Lab. Genetique Environment, Inst. Scis. Evolution, Univ. Montpellier II, Montpellier, 34095, Fr.

SOURCE: Pesticide Science (1997), 51(3), 276-282

CODEN: PSSCBG; ISSN: 0031-613X

PUBLISHER: John Wiley & Sons Ltd.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Organophosphorus and carbamate insecticides are thought to have only one target site, acetylcholinesterase (EC 3.1.1.7). When this enzyme is inhibited, the neurotransmitter acetylcholine is not metabolized and polarization of the post-synaptic membrane does not take place. Results are reported suggesting that choline acetyltransferase (EC 2.3.1.6), the enzyme responsible for the acetylcholine production, may be involved either as an alternative pesticide target site or as a factor enhancing survival during insecticide exposure. This underlines the concept that the pivotal step for insecticide toxicol. is not the acetylcholinesterase activity but the amount of acetylcholine present. This latter can only fluctuate between an upper and a lower threshold, and crossing one of these two thresholds leads to the death of the insect. The interaction between acetylcholinesterase and choline acetyltransferase activities would explain the astonishing toxicol. phenomenon that, in some conditions, mortality decreases when insecticide concentration increases. OS.CITING REF COUNT: 10 THERE ARE 10 CAPLUS RECORDS THAT CITE THIS

RECORD (10 CITINGS)

REFERENCE COUNT: 37 THERE ARE 37 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L43 ANSWER 30 OF 100 MEDLINE on STN DUPLICATE 13

ACCESSION NUMBER: 1998038423 MEDLINE Full-text

DOCUMENT NUMBER: PubMed ID: 9371089

TITLE: Site-directed mutagenesis of an
acetylcholinesterase gene from the yellow fever
mosquito *Aedes aegypti* confers insecticide
insensitivity.

AUTHOR: Vaughan A; Rocheleau T; ffrench-Constant R

CORPORATE SOURCE: Department of Entomology, Russell Laboratories, Madison,
Wisconsin 53706, USA.

SOURCE: Experimental parasitology, (1997 Nov) Vol. 87, No. 3, pp.
237-44.
Journal code: 0370713. ISSN: 0014-4894. L-ISSN: 0014-4894.

PUB. COUNTRY: United States

DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)

LANGUAGE: English

FILE SEGMENT: Priority Journals

ENTRY MONTH: 199712

ENTRY DATE: Entered STN: 9 Jan 1998
Last Updated on STN: 29 Jan 1999
Entered Medline: 23 Dec 1997

AB Insecticide resistance is a serious problem facing the effective control of
insect vectors of disease. Insensitive acetylcholinesterase (AChE) confers
resistance to organophosphorus (OP) and carbamate insecticides and is a
widespread resistance mechanism in vector mosquitoes. Although the point
mutations that underlie AChE insensitivity have been described from
Drosophila, the Colorado potato beetle, and house flies, no resistance
associated mutations have been documented from mosquitoes to date. We are
therefore using a cloned acetylcholinesterase gene from the yellow fever
mosquito *Aedes aegypti* as a model in which to perform site directed
mutagenesis in order to understand the effects of potential resistance
associated mutations. The same resistance associated amino-acid replacements
as found in other insects also confer OP and carbamate resistance to the
mosquito enzyme. Here we describe the levels of resistance conferred by
different combinations of these mutations and the effects of these mutations
on the kinetics of the AChE enzyme. Over-expression of these constructs in
baculovirus will facilitate purification of each of the mutant enzymes and a
more detailed analysis of their associated inhibition kinetics.

L43 ANSWER 31 OF 100 MEDLINE on STN

ACCESSION NUMBER: 1998350606 MEDLINE Full-text

DOCUMENT NUMBER: PubMed ID: 9685989

TITLE: [Determination of insecticide resistance and its
biochemical mechanisms in 2 strains of *Culex*
quinquefasciatus from Santiago de Cuba].
Determinacion de la resistencia a insecticidas y sus
mecanismos bioquimicos en 2 cepas de *Culex*
quinquefasciatus procedentes de Santiago de Cuba.

AUTHOR: Rodriguez M M; Bisset J; Rodriguez I; Diaz C

CORPORATE SOURCE: Instituto de Medicina Tropical Pedro Kouri, Ciudad de La
Habana, Cuba.

SOURCE: Revista cubana de medicina tropical, (1997) Vol. 49, No. 3,
pp. 209-14.
Journal code: 0074364. ISSN: 0375-0760. L-ISSN: 0375-0760.

PUB. COUNTRY: Cuba

DOCUMENT TYPE: (COMPARATIVE STUDY)
(ENGLISH ABSTRACT)
Journal; Article; (JOURNAL ARTICLE)

LANGUAGE: Spanish

FILE SEGMENT: Priority Journals

ENTRY MONTH: 199810

ENTRY DATE: Entered STN: 29 Oct 1998

Last Updated on STN: 29 Oct 1998

Entered Medline: 22 Oct 1998

AB It was analyzed the behavior of the resistance of 3 organophosphated insecticides (malathion, clorpirifos and methyl-pyrimifos), 3 pyrethroids (deltamethrin, lambda-cyhalothrin and cypermethrin), and 1 carbamate (propuxur) in populations of *Culex quinquefasciatus* from 2 municipalities of the province of Santiago de Cuba. The values of the resistance factor proved that there is resistance to malathion and clorpirifos. However, in spite of the existence of a high frequency of the mechanisms of elevated esterases and altered acetylcholinesterase no resistance to methylpymirifos, was observed which demonstrated that this insecticide is not affected by these mechanisms selected in our populations of *Culex quinquefasciatus*. There was resistance to deltamethrin, and lambda-cyhalothrin in Santiago de Cuba, whereas it was moderate to cypermethrin in Santiago and San Luis. Resistance to deltamethrin was also found in San Luis, but it was mild to lambda-cyhalothrin. The results obtained from the use of the synergists S,S,S tributyl phosphotritiade (DBF) and piperonyl butoxide (PB) indicated that the mechanisms of resistance of unspecific esterases and oxidases of multiple function are involved in the resistance to pyrethroids in both strains from Santiago de Cuba and San Luis. It was determined by the biochemical tests that there existed a high frequency of the mechanisms of esterases and altered acetylcholinesterase. The results of the polyacrylamide gel electrophoresis (PAGE) showed that esterase B1 appears more frequently associated with esterases A6 and B6. It was inferred that this association could be connected with the resistance to pyrethroids.

L43 ANSWER 32 OF 100 MEDLINE on STN

ACCESSION NUMBER: 1998155540 MEDLINE Full-text

DOCUMENT NUMBER: PubMed ID: 9494436

TITLE: Pleiotropy of adaptive changes in populations: comparisons among insecticide resistance genes in *Culex pipiens*.

AUTHOR: Chevillon C; Bourguet D; Rousset F; Pasteur N; Raymond M

CORPORATE SOURCE: Institut des Sciences de l'Evolution, Universite Montpellier II, France.. chevillo@isem.univ.montp2.fr

SOURCE: Genetical research, (1997 Dec) Vol. 70, No. 3, pp. 195-203. Journal code: 0370741. ISSN: 0016-6723. L-ISSN: 0016-6723.

PUB. COUNTRY: ENGLAND: United Kingdom

DOCUMENT TYPE: (COMPARATIVE STUDY)
(JOURNAL; Article; (JOURNAL ARTICLE)
(RESEARCH SUPPORT, NON-U.S. GOV'T)

LANGUAGE: English

FILE SEGMENT: Priority Journals

ENTRY MONTH: 199804

ENTRY DATE: Entered STN: 16 Apr 1998

Last Updated on STN: 16 Apr 1998

Entered Medline: 3 Apr 1998

AB Resistance to toxicants is a convenient model for investigating whether adaptive changes are associated with pleiotropic fitness costs. Despite the voluminous literature devoted to this subject, intraspecific comparisons among toxicant resistance genes are rare. We report here results on the pleiotropic effect on adult survival of *Culex pipiens* mutants involved in the same adaptation: the resistance to organophosphorus insecticides. This field study was performed in southern France where four resistance genes sequentially appeared and increased in frequency in response to intense insecticide control. By repeated sampling of overwintering females through winter, we analysed the impact of each of three resistance genes on adult survival. We showed that (i) the most recent gene seems to be of no disadvantage during winter, (ii) the oldest affects survival in some environmental conditions, and (iii) the third induces a constant, severe and dominant survival cost. Such

variability is discussed in relation to the physiological changes involved in resistance.

L43 ANSWER 33 OF 100 SCISEARCH COPYRIGHT (c) 2010 The Thomson Corporation
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ACCESSION NUMBER: 1997:444855 SCISEARCH Full-text
THE GENUINE ARTICLE: XD215
TITLE: Analysis of molecular forms and pharmacological properties
of acetylcholinesterase in several mosquito
species
AUTHOR: Bourguet D (Reprint); Roig A; Toutant J P; Arpagaus M
CORPORATE SOURCE: INRA, GRP CHOLINESTERASES, F-34060 MONTPELLIER 1, FRANCE;
UNIV MONTPELLIER 2, LAB GENET & ENVIRONM, F-34090
MONTPELLIER, FRANCE; INRA, F-06606 ANTIBES, FRANCE
COUNTRY OF AUTHOR: FRANCE
SOURCE: NEUROCHEMISTRY INTERNATIONAL, (JUL 1997) Vol. 31, No. 1,
pp. 65-72.
ISSN: 0197-0186.
PUBLISHER: PERGAMON-ELSEVIER SCIENCE LTD, THE BOULEVARD, LANGFORD
LANE, KIDLINGTON, OXFORD, ENGLAND OX5 1GB.
DOCUMENT TYPE: Article; Journal
FILE SEGMENT: LIFE
LANGUAGE: English
REFERENCE COUNT: 26
ENTRY DATE: Entered STN: 1997
Last Updated on STN: 1997

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB Two acetylcholinesterases (AChE1 and AChE2) have recently been
characterized in the common mosquito *Culex pipiens*. This situation
appeared to be an exception among insects, where only one
acetylcholinesterase gene had previously been repeatedly reported. In
the present study, acetylcholinesterase was studied in five mosquito
species: *Aedes aegypti*, *Anopheles gambiae*; *Anopheles stephensi*, *Culiseta*
longeareolata and *Culex hortensis*, in order to test whether or not two
different acetylcholinesterase enzymes could be detected as occurs in *C.*
pipiens. Molecular forms and catalytic properties of the enzyme show
that only one enzyme species was detected in the five species. This
suggests that a duplication of a single locus Ace probably occurred
recently in the phylogeny tree leading to *C. pipiens*, and produced two
distinct acetylcholinesterases: AChE1 and AChE2. (C) 1997 Elsevier
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ACCESSION NUMBER: 1997:225184 BIOSIS Full-text
DOCUMENT NUMBER: PREV199799516900
TITLE: Acetylcholinesterase in insecticide resistant
Culex tritaeniorhynchus: Characteristics
accompanying insensitivity to inhibitors.
AUTHOR(S): Mamiya, Akira; Ishikawa, Yukio; Kono, Yoshiaki [Reprint
author]
CORPORATE SOURCE: Dep. Medical Entomol., Natl. Inst. Health, Shunjuku-ku,
Tokyo 162, Japan
SOURCE: Applied Entomology and Zoology, (1997) Vol. 32, No. 1, pp.
37-44.
CODEN: APEZAW. ISSN: 0003-6862.
DOCUMENT TYPE: Article
LANGUAGE: English

ENTRY DATE: Entered STN: 22 May 1997

Last Updated on STN: 22 May 1997

AB The acetylcholinesterase (AChE) of the Toyama strain (Toyama) of *Culex tritaeniorhynchus* showed extremely low sensitivity to various kinds of organophosphorus insecticides (OPs) and carbamates. Several characteristics of the AChE of Toyama have been tested and compared with those of the OP susceptible strain (Taiwan). The AChE of Toyama is different from that of Taiwan in many respects. It showed no clear optimum pH and substrate concentration (AChE of Taiwan had both the optimum pH and substrate concentration). Affinity for ACh was high (K_m value for ACh is 0.65 times the value of Taiwan), but affinity for the substrate declined significantly for acetylthiocholine and propionylthiocholine. I_{50} values for OPs were extremely high (66.1-7,079 times the value for Taiwan), and those for carbamates were also higher than those for Taiwan (20.4-112 times). These results suggest that the structure of the AChE of Toyama has changed to an ACh specific form which has a remarkably lower affinity to the OP compounds.

L43 ANSWER 35 OF 100 BIOSIS COPYRIGHT (c) 2010 The Thomson Corporation on STN

ACCESSION NUMBER: 1996:538783 BIOSIS Full-text

DOCUMENT NUMBER: PREV199699261139

TITLE: Existence of two acetylcholinesterases in the mosquito *Culex pipiens* (Diptera: Culicidae).

AUTHOR(S): Bourguet, Denis; Raymond, Michel; Fournier, Didier; Malcolm, Colin A.; Toutant, Jean-Pierre; Arpagaus, Martine [Reprint author]

CORPORATE SOURCE: DCC/INRA, 2 place Viale, 34060 Montpellier Cedex 01, France

SOURCE: Journal of Neurochemistry, (1996) Vol. 67, No. 5, pp. 2115-2123.

CODEN: JONRA9. ISSN: 0022-3042.

DOCUMENT TYPE: Article

LANGUAGE: English

ENTRY DATE: Entered STN: 10 Dec 1996

Last Updated on STN: 23 Jan 1997

AB Two acetylcholinesterases (AChEs), AChE1 and AChE2, differing in substrate specificity and in some aspects of inhibitor sensitivity, have been characterized in the mosquito *Culex pipiens*. The results of ultracentrifugation in sucrose gradients and nondenaturing gel electrophoresis of AChE activity peak fractions show that each AChE is present as two molecular forms: one amphiphilic dimer possessing a glycolipid anchor and one hydrophilic dimer that does not interact with nondenaturing detergents. Treatment by phosphatidylinositol-specific phospholipase C converts each type of amphiphilic dimer into the corresponding hydrophilic dimer. Molecular forms of AChE1 have a lower electrophoretic mobility than those of AChE2. However, amphiphilic dimers and hydrophilic dimers have similar sedimentation coefficients (5.5S and 6.5S, respectively). AChE1 and AChE2 dimers, amphiphilic or hydrophilic, resist dithiothreitol reduction under conditions that allow reduction of *Drosophila* AChE dimers. In the insecticide-susceptible strain S-LAB, AChE1 is inhibited by 5 times 10^{-4} M propoxur (a carbamate insecticide), whereas AChE2 is resistant. All animals are killed by this concentration of propoxur, indicating that only AChE1 fulfills the physiological function of neurotransmitter hydrolysis at synapses. In the insecticide-resistant strain, MSE, there is no mortality after exposure to 5 times 10^{-4} M propoxur: AChE2 sensitivity to propoxur is unchanged, whereas AChE1 is now resistant to 5 times 10^{-4} M propoxur. The possibility that AChE1 and AChE2 are products of tissue-specific posttranslational modifications of a single gene is discussed, but we suggest, based on recent results obtained at

the molecular level in mosquitoes, that they are encoded by two different genes.

L43 ANSWER 36 OF 100 BIOSIS COPYRIGHT (c) 2010 The Thomson Corporation on STN

ACCESSION NUMBER: 1996:536167 BIOSIS Full-text
DOCUMENT NUMBER: PREV199699258523
TITLE: An insensitive acetylcholinesterase in
Culex pipiens (Diptera: Culicidae) from
Portugal.
AUTHOR(S): Bourguet, Denis [Reprint author]; Capela, Ruben; Raymond,
Michel
CORPORATE SOURCE: Inst. Sci. Evol., Lab. Genet. Environ., Univ. Montpellier
II, Place Eugene Bataillon, 34095 Montpellier, France
SOURCE: Journal of Economic Entomology, (1996) Vol. 89, No. 5, pp.
1060-1066.
CODEN: JEENAI. ISSN: 0022-0493.
DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 10 Dec 1996
Last Updated on STN: 10 Dec 1996

AB Resistance mechanisms of a strain (PRAIAS) of northern house mosquito, *Culex pipiens* L., collected in Portugal in 1993, and highly resistant to organophosphates and carbamates, were investigated by comparing the resistance characteristics to 3 organophosphorous (temephos, chlorpyrifos, malathion) and 1 carbamate (propoxur) insecticides in the presence or absence of synergists; and by determining the possible occurrence of overproduced esterases or insensitive acetylcholinesterase (AChE). The reference strain MSE from southern France, with an insensitive AChE, was included in all analyses for comparison. For organophosphorous insecticides, resistance in PRAIAS was caused by an insensitive AChE and an increase in oxidative metabolism, although the 2nd mechanism has only a marginal effect. For propoxur, the insensitive AChE was the only resistance mechanism detected. Biochemical properties of both the French and Portuguese insensitive AChEs were similar. We cannot exclude the possibility that PRAIAS and MSE strains possess exactly the same insensitive AChE allele.

L43 ANSWER 37 OF 100 MEDLINE on STN

ACCESSION NUMBER: 1997136237 MEDLINE Full-text
DOCUMENT NUMBER: PubMed ID: 8981762
TITLE: Insecticide resistance genes in mosquitoes: their
mutations, migration, and selection in field populations.
AUTHOR: Pasteur N; Raymond M
CORPORATE SOURCE: Institut des Sciences de l'Evolution (URA CNRS 327),
Genetique et Environnement, Universite de Montpellier-2,
France.
SOURCE: The Journal of heredity, (1996 Nov-Dec) Vol. 87, No. 6, pp.
444-9. Ref: 52
Journal code: 0375373. ISSN: 0022-1503. L-ISSN: 0022-1503.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
(RESEARCH SUPPORT, NON-U.S. GOV'T)
General Review; (REVIEW)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199701
ENTRY DATE: Entered STN: 19 Feb 1997
Last Updated on STN: 19 Feb 1997

Entered Medline: 23 Jan 1997

AB Insecticides have been used intensively to control insect populations over the last 50 years and many species of insects have developed resistance to several families of insecticides. These resistances are mainly due to two mechanisms: mutation of the insecticide target protein (leading to a decrease in its affinity for the concerned insecticide family), and increased detoxification. Recent molecular studies suggest that the mutations conferring resistance are rare and sometimes unique events in any given species. The wide geographic distribution of some of these genes can then only be explained by the balance between migration and selection at the population level.

L43 ANSWER 38 OF 100 MEDLINE on STN DUPLICATE 14
ACCESSION NUMBER: 1996304605 MEDLINE Full-text
DOCUMENT NUMBER: PubMed ID: 8722792
TITLE: Dominance of insecticide resistance presents a plastic response.
AUTHOR: Bourguet D; Prout M; Raymond M
CORPORATE SOURCE: Institut des Sciences de l'Evolution, Universite Montpellier II, France.. bourguet@isem.univ-montp2.fr
SOURCE: Genetics, (1996 May) Vol. 143, No. 1, pp. 407-16.
Journal code: 0374636. ISSN: 0016-6731. L-ISSN: 0016-6731.
Report No.: NLM-PMC1207273.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
(RESEARCH SUPPORT, NON-U.S. GOV'T)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199610
ENTRY DATE: Entered STN: 25 Oct 1996
Last Updated on STN: 25 Oct 1996
Entered Medline: 11 Oct 1996

AB Dominance level of insecticide resistance provided by one major gene (an insensitive acetylcholinesterase) in the mosquito *Culex pipiens* was studied in two distinct environments. Dominance level was found to be very different environments, varying from almost complete dominance to almost recessive when either propoxur (a carbamate insecticide) or chlorpyrifos (an organophosphorus insecticide) was used. To better understand this plastic response, three environmental parameters were manipulated and their interactions studied. For chlorpyrifos, each parameter had a small effect, but when all parameters were changed, the dominance level was greatly affected. For propoxur, one environmental parameter had a large effect by itself. It was further studied to understand the causal relationship of this plasticity. Recessivity of resistance was associated with more demanding environments. These results are discussed in the context of the various theories of the evolution of dominance. It appears that dominance of insecticide resistance cannot be directly predicted by Wright's physiological theory.

L43 ANSWER 39 OF 100 BIOSIS COPYRIGHT (c) 2010 The Thomson Corporation on STN
ACCESSION NUMBER: 1997:65160 BIOSIS Full-text
DOCUMENT NUMBER: PREV199799364363
TITLE: Duplication of the Ace.1 locus in *Culex pipiens* mosquitoes from the Caribbean.
AUTHOR(S): Bourguet, Denis [Reprint author]; Raymond, Michel; Bisset, Juan; Pasteur, Nicole; Arpagaus, Martine
CORPORATE SOURCE: Inst. Sci. Evol., Lab. Genet. Environ., UMR 5554, Univ. Montpellier II, F-34095 Montpellier, Cedex 05, France
SOURCE: Biochemical Genetics, (1996) Vol. 34, No. 9-10, pp.

351-362.
CODEN: BIGEBA. ISSN: 0006-2928.

DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 11 Feb 1997
Last Updated on STN: 11 Feb 1997

AB In *Culex pipiens* mosquitoes, AChE1 encoded by the locus Ace. 1 is the target of organophosphorus and carbamate insecticides. In several resistant strains homozygous for Ace.1-RR, insensitive AChE1 is exclusively found. An unusual situation occurs in two Caribbean resistant strains where each mosquito, at each generation, displays a mixture of sensitive and insensitive AChE1. These mosquitoes are not heterozygotes, Ace.1-RS, as preimaginal mortalities cannot account for the lethality of both homozygous classes. This situation is best explained by the existence of two Ace.1 loci, coding, respectively, a sensitive and an insensitive AChE1. Thus, we suggest that in the Caribbean a duplication of the Ace.1 locus occurred before the appearance of insecticide resistance at one of the two copies.

L43 ANSWER 40 OF 100 BIOSIS COPYRIGHT (c) 2010 The Thomson Corporation on
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ACCESSION NUMBER: 1997:13264 BIOSIS Full-text
DOCUMENT NUMBER: PREV199799312467
TITLE: Determination of Ace: 1. Genotypes in single mosquitoes:
Toward an ecumenical biochemical test.
AUTHOR(S): Bourguet, Denis [Reprint author]; Pasteur, Nicole [Reprint
author]; Bisset, Juan; Raymond, Michel [Reprint author]
CORPORATE SOURCE: Inst. Sci. Evol., Lab. Genet. Environ., Univ. Montpellier
II, F-34095 Montpellier Cedex 05, France
SOURCE: Pesticide Biochemistry and Physiology, (1996) Vol. 55, No.
2, pp. 122-128.
CODEN: PCBPBS. ISSN: 0048-3575.
DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 15 Jan 1997
Last Updated on STN: 23 Jan 1997

AB The occurrence of two acetylcholinesterases, AChE1 and AChE2, in the mosquito *Culex pipiens* has been recently documented. Resistance to organophosphates and carbamates due to target insensitivity is the result of a qualitative change of only AChE1, encoded by the Ace.1 gene. Because AChE1 and AChE2 differ in their sensitivity to inhibitors, Ace.1 genotypes can be misclassified by previous tests. We describe a new rapid microplate test that allows unambiguous identification of Ace.1 genotypes. This test involves comparing AChE activities in the absence of insecticide and in the presence of two propoxur concentrations: a low concentration that inhibits only the sensitive AChE1 and a higher concentration that inhibits also AChE2 but not the insensitive AChE1 responsible of insecticide resistance. This comparison allows the identification of the three Ace.1 genotypes: resistant (Ace.1-RR), susceptible (Ace.1-SS) homozygotes, and heterozygotes (Ace.1-RS). The similarity of propoxur sensitivity of modified AChE1s found in various resistant strains from the United States, Europe, and Africa indicates that this test is probably suitable for all the Ace. 1 alleles described so far in *C. pipiens*.

L43 ANSWER 41 OF 100 BIOSIS COPYRIGHT (c) 2010 The Thomson Corporation on
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ACCESSION NUMBER: 1996:288051 BIOSIS Full-text
DOCUMENT NUMBER: PREV199699010407
TITLE: Organophosphate resistance in *Culex pipiens* from

Cyprus.
AUTHOR(S): Wirth, Margaret C.; Georghiou, George P.
CORPORATE SOURCE: Dep. Entomol., Univ. Calif., Riverside, CA 92521, USA
SOURCE: Journal of the American Mosquito Control Association,
(1996) Vol. 12, No. 1, pp. 112-118.
CODEN: JAMAET. ISSN: 8756-971X.

DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 25 Jun 1996
Last Updated on STN: 25 Jun 1996

AB Populations of *Culex pipiens* were sampled from 8 locations in Cyprus between 1987 and 1993. All population samples generally revealed organophosphate resistance to malathion, temephos, chlorpyrifos, fenthion, dichlorvos, and pirimiphos methyl, in decreasing order of magnitude. Of 7 populations assessed with the carbamate propoxur, all proved to be resistant to different degrees. Of the 6 populations tested with permethrin, 2 were resistant to permethrin. Resistance was associated with the presence of 5 different overproduced esterases (esterases A1, A2, A5, B2, and B5) as well as an insensitive form of acetylcholinesterase. These results are discussed in relation to the ongoing mosquito abatement program in Cyprus and to similar programs in other parts of the world.

L43 ANSWER 42 OF 100 CAPLUS COPYRIGHT 2010 ACS on STN DUPLICATE 15

ACCESSION NUMBER: 1996:624051 CAPLUS Full-text
DOCUMENT NUMBER: 125:268008
ORIGINAL REFERENCE NO.: 125:49877a, 49880a
TITLE: Single versus multiple origins of insecticide
resistance: inferences from the cyclodiene resistance
gene Rdl
AUTHOR(S): ffrench-Constant, Richard H.; Anthony, Nicola M.;
Andreev, Dmitri; Aronstein, Kate
CORPORATE SOURCE: Dep. Entomology, Univ. Wisconsin, Madison, WI, 53706,
USA
SOURCE: ACS Symposium Series (1996), 645(Molecular Genetics
and Evolution of Pesticide Resistance), 106-116
CODEN: ACSMC8; ISSN: 0097-6156
PUBLISHER: American Chemical Society
DOCUMENT TYPE: Journal; General Review
LANGUAGE: English

AB A review, with 35 refs. The number of independent origins of insecticide resistance alleles is currently the subject of intense debate. Support for the importance of a single point of origin and spread of resistance through insect populations comes from studies of amplified esterases and insensitive acetylcholinesterase in *Culex* mosquitoes. Here we argue that it is difficult to determine precisely the number of origins of resistance alleles due to the complexity of the two mechanisms studied in *Culex*. The repeated replacement of the same amino acid in the Resistance to dieldrin (Rdl) gene, conferring resistance to cyclodiene insecticides, offers a model system within which to examine the diversity and origins of resistance alleles. By comparing Rdl alleles in two *Drosophila* species, two beetle species and the *Bemisia tabaci* whitefly complex we present repeated evidence for multiple independent origins of resistance. Evidence for independent origins comes not only from the finding of different replacements of this same amino acid but also flanking sequence data supporting multiple origins of the same amino acid replacement. Further, we emphasize that the life history of the insect under consideration can play a major role in determining the likely origin and spread of different resistance alleles.

OS.CITING REF COUNT: 7 THERE ARE 7 CAPLUS RECORDS THAT CITE THIS RECORD
(7 CITINGS)

L43 ANSWER 43 OF 100 BIOSIS COPYRIGHT (c) 2010 The Thomson Corporation on
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ACCESSION NUMBER: 1996:266246 BIOSIS Full-text
DOCUMENT NUMBER: PREV199698822375
TITLE: Different insecticides select multiple
carboxylesterase isoenzymes and different resistance levels
from a single population of *Culex*
quinquefasciatus.
AUTHOR(S): Karunaratne, S. H. P. Parakrama; Hemingway, Janet [Reprint
author]
CORPORATE SOURCE: Dep. Pure Applied Biol., Univ. Wales, Cardiff, P.O. Box
915, Cardiff CF1 3TL, UK
SOURCE: Pesticide Biochemistry and Physiology, (1996) Vol. 54, No.
1, pp. 4-11.
CODEN: PCBPBS. ISSN: 0048-3575.
DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 10 Jun 1996
Last Updated on STN: 10 Jun 1996

AB Amplification of two carboxylesterases, Est-alpha-2-1 and Est-beta-2-1, is the
major insecticide resistance mechanism in the field-collected Pet strain of
the mosquito *Culex quinquefasciatus*. Three colonies were selected from the
Pet strain with three different insecticides. Both esterases Est-alpha-2-1
and Est-beta-2-1 were partially purified from each colony and their
bimolecular rate constants (k_{α} 's) for the interaction with insecticides
were measured. Significant intercolony differences were observed for the k_{α} -
values suggesting that different esterase isoenzymes or mixtures of isoenzymes
occur within each colony. This may be due to different proportions of the
nonamplified carboxylesterases Est-alpha-3 and Est-beta-1-3 being present in
the predominantly Est-alpha-2-1 and Est-beta-2-1 preparations. An altered
acetylcholinesterase mechanism, which was present at a very low initial
frequency in the parental colony, was also differentially selected and
contributed to the differences in resistance in the colonies. Neither
glutathione S-transferases nor monooxygenases appear to be involved in this
resistance.

L43 ANSWER 44 OF 100 LIFESCI COPYRIGHT 2010 CSA on STN DUPLICATE 16

ACCESSION NUMBER: 96:83564 LIFESCI Full-text
TITLE: Cloning, sequencing and function expression of an
acetylcholinesterase gene from the yellow fever
mosquito *Aedes aegypti*
AUTHOR: Anthony, N.; Rocheleau, T.; Mocelin, G.; Lee, Hwa-Jung;
Ffrench-Constant, R.*
CORPORATE SOURCE: Dep. Neurosci., Univ. Wisconsin at Madison, Madison, WI
53706, USA
SOURCE: FEBS LETT., (1995) vol. 368, no. 3, pp. 461-465.
ISSN: 0014-5793.
DOCUMENT TYPE: Journal
FILE SEGMENT: N; G; Z
LANGUAGE: English
SUMMARY LANGUAGE: English

AB A degenerate PCR strategy was used to isolate a fragment of the
acetylcholinesterase gene (Ace) homolog from *Aedes aegypti* and screen for a
cDNA clone containing the complete open reading frame of the gene. The
predicted amino acid sequence of the *Aedes* gene shares 64% identity with Ace
from *Drosophila* and 87% identity with the acetylcholinesterase gene from
another mosquito species *Anopheles stephensi*. High levels of expression of the
Aedes gene were achieved by infection of Sf21 cells with a recombinant
baculovirus containing the *Aedes* Ace cDNA. The catalytic properties and

sensitivity of the recombinant enzyme to insecticide inhibition are described and discussed in relation to the role of insensitive AChE in conferring resistance to organophosphorus and carbamate insecticides.

L43 ANSWER 45 OF 100 LIFESCI COPYRIGHT 2010 CSA on STN DUPLICATE 17

ACCESSION NUMBER: 96:43561 LIFESCI Full-text
TITLE: Characterization of resistance to organophosphate, carbamate, and pyrethroid insecticides in field populations of *Aedes aegypti* from Venezuela
AUTHOR: Mazzarri, M.B.; Georghiou, G.P.
CORPORATE SOURCE: Ministerio de Sanidad y Asistencia Social, A artado 4540, Maracay, Venezuela
SOURCE: J. AM. MOSQ. CONTROL ASSOC., (1995) vol. 11, no. 3, pp. 315-322.
ISSN: 8756-971X.
DOCUMENT TYPE: Journal
FILE SEGMENT: Z
LANGUAGE: English
SUMMARY LANGUAGE: English

AB Resistance to the organophosphates (OP) temephos, malathion, and pirimiphos methyl, and the carbamate propoxur was found to be low (<5-fold) in 3 *Aedes aegypti* populations collected from Falcon and Aragua states of Venezuela. Resistance to chlorpyrifos (OP), permethrin, and lambda -cyhalothrin (pyrethroids) was moderate (7-fold) in both populations. Mechanisms of resistance were investigated with the synergists piperonyl butoxide (mixed function oxidase inhibitor) and S, S, S-tributyl phosphorothioate (DEF, an esterase inhibitor). Nonspecific esterase and oxidase enzymes played a significant role in OP and carbamate resistance, respectively. Resistance to pyrethroid insecticides was not affected by DEF or piperonyl butoxide. This suggested the presence of another mechanism such as altered target site sensitivity (kdr). Biochemical tests showed significantly greater amounts of esterase activity in field strains, whereas insensitive acetylcholinesterase was not involved in either OP or carbamate resistance. These results must be considered in future control programs for *Ae. aegypti* because OPs and pyrethroids are currently used in vector control in most countries of Central and South America.

L43 ANSWER 46 OF 100 SCISEARCH COPYRIGHT (c) 2010 The Thomson Corporation on STN

ACCESSION NUMBER: 1995:263094 SCISEARCH Full-text
THE GENUINE ARTICLE: QT416
TITLE: DETECTION OF CYCLODIENE INSECTICIDE RESISTANCE-ASSOCIATED MUTATIONS BY SINGLE-STRANDED CONFORMATIONAL POLYMORPHISM ANALYSIS
AUTHOR: COUSTAU C (Reprint); FFRENCHCONSTANT R
CORPORATE SOURCE: UNIV WISCONSIN, DEPT ENTOMOL, RUSSELL LABS 237, MADISON, WI 53706
COUNTRY OF AUTHOR: USA
SOURCE: PESTICIDE SCIENCE, (APR 1995) Vol. 43, No. 4, pp. 267-271.
ISSN: 0031-613X.
PUBLISHER: JOHN WILEY & SONS LTD, BAFFINS LANE CHICHESTER, W SUSSEX, ENGLAND PO19 1UD.
DOCUMENT TYPE: Article; Journal
FILE SEGMENT: AGRI
LANGUAGE: English
REFERENCE COUNT: 23
ENTRY DATE: Entered STN: 1995
Last Updated on STN: 1995

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB Cyclodiene insecticide resistance is associated with replacements of a single amino acid within the putative lining of a delta-aminobutyric acid (GABA)-gated chloride ion channel gene Resistance to dieldrin (Rdl). Only two resistance-associated amino acid replacements have been identified; alanine to serine in *Drosophila melanogaster*, *D. simulans*, *Aedes aegypti*, and *Tribolium castaneum* and alanine to glycine as a second allele in *D. simulans*. Here we report that single stranded conformational polymorphism (SSCP) analysis of genomic DNA, amplified by the polymerase chain reaction (PCR) for exon 7 of the Rdl gene, can be used to genotype strains or individuals of all of these insects. This technique also appears simultaneously to distinguish between *D. melanogaster* and *D. simulans*, sibling species only reliably identifiable by examination of male genitalia. The relative advantages of this genotyping technique against other PCR-mediated techniques in monitoring for insecticide resistance are discussed.

L43 ANSWER 47 OF 100 MEDLINE on STN

ACCESSION NUMBER: 1999030963 MEDLINE Full-text

DOCUMENT NUMBER: PubMed ID: 9813467

TITLE: [The association of resistance to organophosphate, carbamate and pyrethroid insecticides with the mechanisms of resistance observed in *Culex quinquefasciatus* strains from Ciudad de La Habana province].

Asociacion de la resistencia a insecticidas organofosforados, carbamatos y piretroides con los mecanismos de resistencia observados en cepas de *Culex quinquefasciatus* de Ciudad de La Habana.

AUTHOR: Rodriguez M M; Bisset J A; Mastrapa L; Diaz C

CORPORATE SOURCE: Instituto de Medicina Tropical Pedro Kouri.

SOURCE: Revista cubana de medicina tropical, (1995) Vol. 47, No. 3, pp. 154-60.

Journal code: 0074364. ISSN: 0375-0760. L-ISSN: 0375-0760.

PUB. COUNTRY: Cuba

DOCUMENT TYPE: (ENGLISH ABSTRACT)

Journal; Article; (JOURNAL ARTICLE)

LANGUAGE: Spanish

FILE SEGMENT: Priority Journals

ENTRY MONTH: 199811

ENTRY DATE: Entered STN: 6 Jan 1999

Last Updated on STN: 6 Jan 1999

Entered Medline: 25 Nov 1998

AB The mechanisms of resistance in *Culex quinquefasciatus* from 6 municipalities of Havana City were studied in order to determine their genetic frequency. Increased esterases and altered acetylcholinesterase are still being the major resistance mechanisms in Havana City. The mechanisms of esterases is of high frequency, followed by altered acetylcholinesterase. Resistance to chlorpyrifos was found for the first time in *Culex quinquefasciatus*, while resistance of malathion and carbamate propoxur is maintained, and deterioration to pyrethroid susceptibility is being detected. The synergistic effect of S.S.S. trubutyl phosphotriade (DEF) and piperonil butoxide (PB) was analysed, and it was proven that esterases enzymes and multifunction oxidases are involved in the resistance to pyrethroids. By electrophoresis in polyerylamide gel, it was determined that the combination of esterases that seems to be associated with the resistance to pyrethroids is B1-A6-B6, which appeared with the greatest percentage. Values of genetic frequency in the 6 municipalities were found to be high, for both esterase genes and acetylcholinesterase genes (Ache).

L43 ANSWER 48 OF 100 BIOSIS COPYRIGHT (c) 2010 The Thomson Corporation on
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ACCESSION NUMBER: 1995:553217 BIOSIS Full-text
DOCUMENT NUMBER: PREV199698567517
TITLE: The cross-reactivity of a polyclonal antiserum raised
against the native amplified A-2 esterase involved in
insecticide resistance.
AUTHOR(S): Karunaratne, S. H. P. Parakrama; Jaywardena, K. G.
Indrananda; Hemingway, Janet [Reprint author]
CORPORATE SOURCE: Dep. Pure Applied Biol., Univ. Wales Cardiff, P. O. Box
915, Cardiff CF1 2TL, UK
SOURCE: Pesticide Biochemistry and Physiology, (1995) Vol. 53, No.
2, pp. 75-83.
CODEN: PCBPBS. ISSN: 0048-3575.
DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 31 Dec 1995
Last Updated on STN: 31 Dec 1995

AB Broad-spectrum insecticide resistance in the mosquito *Culex quinquefasciatus*
is usually due to the overproduction of A- and B-type carboxylesterases (EC
3.1.1.1). Antiserum was raised against the carboxylesterase A-2 purified from
an organophosphate-resistant *Culex* strain. This antiserum was used to show
that, contrary to earlier reports, the A-2 esterase is immunologically related
to other A- and B-type carboxylesterases from resistant and susceptible *Culex*
strains. Dot-blot immunoassays revealed that the purified esterase B-2 is
about 50-fold less reactive with the antiserum than the purified esterase A-2.
A strong immunological relationship was observed between the A-2 antiserum and
the organophosphate and carbamate target site acetylcholinesterase. A lower
cross-reactivity with *Anopheles stephensi* esterases and no reactivity with
resistance-associated esterases from grain beetles, planthoppers, and
cockroaches were observed. The antiserum cross-reacted with some commercially
available vertebrate esterases indicating its affinities with these enzymes.
The observed cross-reactivity is not due to the antiserum cross-reacting with
glycosylated residues, as the A-2 esterase to which the antiserum was raised
is unglycosylated. The utility of this antiserum in future esterase cDNA
cloning programs is discussed.

L43 ANSWER 49 OF 100 SCISEARCH COPYRIGHT (c) 2010 The Thomson Corporation
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ACCESSION NUMBER: 1995:365010 SCISEARCH Full-text
THE GENUINE ARTICLE: QZ834
TITLE: POST-INOCULATION CHANGES IN ENZYME-ACTIVITY OF
Aedes-Aegypti INFECTED WITH CHIKUNGUNYA VIRUS
AUTHOR: MOURYA D T (Reprint)
CORPORATE SOURCE: NATL INST VIROL, DEPT MED ENTOMOL, 20-A DR AMBEDKAR RD,
POONA 411001, MAHARASHTRA, INDIA (Reprint)
AUTHOR: HEMINGWAY J; LEAKE C J
CORPORATE SOURCE: UNIV LONDON LONDON SCH HYG & TROP MED, DEPT MED PARASITOL,
LONDON WC1E 7HT, ENGLAND
COUNTRY OF AUTHOR: INDIA; ENGLAND
SOURCE: ACTA VIROLOGICA, (FEB 1995) Vol. 39, No. 1, pp. 31-35.
ISSN: 0001-723X.
PUBLISHER: SLOVAK ACADEMIC PRESS LTD, PO BOX 57 NAM SLOBODY 6, 810 05
BRATISLAVA, SLOVAKIA.
DOCUMENT TYPE: Article; Journal
LANGUAGE: English
REFERENCE COUNT: 11

ENTRY DATE: Entered STN: 1995
Last Updated on STN: 1995

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB Levels of acetylcholinesterase, non-specific esterases, glutathione-S-transferase and glucose-6-phosphate dehydrogenase in *Aedes aegypti* (L.) mosquitoes inoculated intrathoracally with Chikungunya virus were elevated, as compared to uninoculated control insects. A number of these enzymes are important in the insects defence mechanism against xenobiotics, such as pesticides. Malathion bioassays indicated a reduction in the susceptibility of experimentally injected insects with virus or virus-free inoculum, compared to non-inoculated controls. However, insects which were mock-inoculated (infected with no inoculum) showed a similar reduction in susceptibility suggesting that the observed effect was due to the mobilization of a defence reaction in the mosquitoes in response to injury during inoculation.

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ACCESSION NUMBER: 1994:260974 BIOSIS Full-text

DOCUMENT NUMBER: PREV199497273974

TITLE: Resistance monitoring in *Culex pipiens* (Diptera: Culicidae) from Central-Eastern France.

AUTHOR(S): Rivet, Yannick; Raymond, Michel; Rioux, Jean A.; Delalbre, Annie; Pasteur, Nicole [Reprint author]

CORPORATE SOURCE: Inst. Sciences l'Evolution, Lab. Genetique Environnement, Univ. Montpellier II, Case courrier 65, 34095 Montpellier, France

SOURCE: Journal of Medical Entomology, (1994) Vol. 31, No. 2, pp. 231-239.

CODEN: JMENA6. ISSN: 0022-2585.

DOCUMENT TYPE: Article

LANGUAGE: English

ENTRY DATE: Entered STN: 8 Jun 1994

Last Updated on STN: 9 Jun 1994

AB Insensitive acetylcholinesterase (Ace-R) and five over-produced esterases (A1, A2 and B2, and A4 and B4) involved in detoxification are responsible for resistance to organophosphorous insecticides (OPs) in *Culex pipiens* L. from the Rhone-Alpes region, where *C. pipiens* control is mainly accomplished with the OPs temephos and chlorpyrifos using 0.15 mg/liter doses. The strong linkage disequilibria observed between esterases A1 and Est-2-0.64, esterases A4 and B4, and esterases A2 and B2 indicate that these genes were introduced in the Rhone-Alpes region. Ace-R and esterase A1, which appeared in the south of France 3 yr before the start of mosquito control in Rhone-Alpes, had the highest frequencies. All resistant genotypes were shown to be killed by 0.15 mg/liter temephos in natural breeding sites, but not by 0.15 mg/liter chlorpyrifos. These results are discussed in relation with mosquito control strategies.

L43 ANSWER 51 OF 100 SCISEARCH COPYRIGHT (c) 2010 The Thomson Corporation on STN

ACCESSION NUMBER: 1995:29596 SCISEARCH Full-text

THE GENUINE ARTICLE: PZ577

TITLE: PRINCIPLES OF INSECTICIDE RESISTANCE MANAGEMENT

AUTHOR: GEORGHIOU G P (Reprint)

CORPORATE SOURCE: UNIV CALIF RIVERSIDE, DEPT ENTOMOL, RIVERSIDE, CA 92507 (Reprint)

COUNTRY OF AUTHOR: USA

SOURCE: PHYTOPROTECTION, (1994) Vol. 75, Supp. [S], pp. 51-59.

ISSN: 0031-9511.
PUBLISHER: QUEBEC SOC PROTECT PLANTS, PHYTOPROTECTION, 3488 CHEMIN
SAINTE-FOY, ST FOY PQ G1X 2S8, CANADA.
DOCUMENT TYPE: Article; Journal
FILE SEGMENT: AGRI
LANGUAGE: English
REFERENCE COUNT: 50
ENTRY DATE: Entered STN: 1995
Last Updated on STN: 1995

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB The need for effective strategies in resistance management is becoming more pressing as the number of insecticide-resistant species continues to increase worldwide while insecticide resources are diminishing. Prospects for development of such strategies are enhanced by recent advances in knowledge on the biochemistry, molecular genetics, ecology, dynamics, monitoring, and other important aspects of resistance. The generally recognized approaches to resistance management are grouped under three principal categories: first, low selection pressure, supplemented by a strong component of non-chemical measures (management by moderation); second, elimination of the selective advantage of resistant individuals by increasing insecticide uptake through the use of attractants, or by suppressing of detoxication enzymes through the use of synergists (management by saturation); and third, application of multi-directional selection by means of mixtures or rotations of unrelated insecticides or by use of chemicals with multi-site action (management by multiple attack). These approaches are not mutually exclusive and elements from each can be used to formulate a season-long management program. The strategy chosen must be based on a thorough knowledge of the resistance implications of the candidate insecticides and of the biology and ecology of the species concerned, and must make use of all available non-chemical control measures.

L43 ANSWER 52 OF 100 SCISEARCH COPYRIGHT (c) 2010 The Thomson Corporation
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ACCESSION NUMBER: 1994:371152 SCISEARCH Full-text
THE GENUINE ARTICLE: NQ394
TITLE: MODIFICATION OF ACETYLCHOLINESTERASE AS A
MECHANISM OF RESISTANCE EO INSECTICIDES
AUTHOR: FOURNIER D (Reprint)
CORPORATE SOURCE: UNIV TOULOUSE 3, ENTOMOL LAB, 118 ROUTE NARBONNE, F-31062
TOULOUSE, FRANCE (Reprint)
AUTHOR: MUTERO A
CORPORATE SOURCE: UNIV CALIF SAN DIEGO, SCH MED, DEPT PHARMACOL, LA JOLLA,
CA 92093
COUNTRY OF AUTHOR: FRANCE; USA
SOURCE: COMPARATIVE BIOCHEMISTRY AND PHYSIOLOGY C-PHARMACOLOGY
TOXICOLOGY & ENDOCRINOLOGY, (MAY 1994) Vol. 108, No. 1,
pp. 19-31.
ISSN: 0742-8413.
PUBLISHER: PERGAMON-ELSEVIER SCIENCE LTD, THE BOULEVARD, LANGFORD
LANE, KIDLINGTON, OXFORD, ENGLAND OX5 1GB.
DOCUMENT TYPE: General Review; Journal
FILE SEGMENT: LIFE
LANGUAGE: English
REFERENCE COUNT: 113
ENTRY DATE: Entered STN: 1994
Last Updated on STN: 1994
ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS

AB In insects, acetylcholinesterase is essential for life and its inhibition by organophosphorus or carbamate insecticides is lethal. Extensive use of these insecticides to control insect pests has led to resistant enzymes, less inhibited than the wild type enzyme. Some mutations responsible for resistance have been identified. The resulting mutated proteins present new catalytic properties towards substrates and inhibitors. The presence of an altered enzyme has several consequences on the genetics of resistance and maintenance of resistant alleles in natural populations.

L43 ANSWER 53 OF 100 MEDLINE on STN DUPLICATE 19
ACCESSION NUMBER: 1994065763 MEDLINE Full-text
DOCUMENT NUMBER: PubMed ID: 7504077
TITLE: Resistance to temephos, an organophosphorous insecticide, in Culex pipiens from Tunisia, North Africa.
AUTHOR: Ben Cheikh H; Pasteur N
CORPORATE SOURCE: Laboratoire de Genetique, Universite du Centre, Faculte de Medecine de Monastir, Tunisia.
SOURCE: Journal of the American Mosquito Control Association, (1993 Sep) Vol. 9, No. 3, pp. 335-7.
Journal code: 8511299. ISSN: 8756-971X. L-ISSN: 8756-971X.
PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
(RESEARCH SUPPORT, NON-U.S. GOV'T)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199401
ENTRY DATE: Entered STN: 1 Feb 1994
Last Updated on STN: 29 Jan 1996
Entered Medline: 3 Jan 1994

AB Resistance to temephos, an organophosphorous insecticide (OP), was found to be low (2-fold) in 2 Culex pipiens populations collected in Sayada (mid-eastern Tunisia). This resistance was synergized by an esterase inhibitor (DEF). Two sets of over-produced esterases (A2-B2 and A4-B4), known to be involved in resistance, were identified in almost 50% of the examined insects. In addition, 3% of insects had an insensitive acetylcholinesterase. After selecting larvae of one of the samples (ES) with temephos for 6 generations, a 9-fold increase in resistance was observed, and all mosquitoes were found to carry esterases A2-B2 and an insensitive acetylcholinesterase. These results must be considered in future mosquito control programs, since 2 of the identified genes can lead to high resistance to several organophosphorous insecticides.

L43 ANSWER 54 OF 100 LIFESCI COPYRIGHT 2010 CSA on STN
ACCESSION NUMBER: 94:20667 LIFESCI Full-text
TITLE: Resistance to temephos, an organophosphorous insecticide, in Culex pipiens from Tunisia, North Africa
AUTHOR: Cheikh, H.B.; Pasteur, N.
CORPORATE SOURCE: Lab. Genet., Univ. Cent., Fac. Med. Monastir, 5019 Monastir, Tunisia
SOURCE: J. AM. MOSQ. CONTROL ASSOC., (1993) vol. 9, no. 3, pp. 335-337.
DOCUMENT TYPE: Journal
FILE SEGMENT: Z
LANGUAGE: English
SUMMARY LANGUAGE: English

AB Resistance to temephos, an organophosphorous insecticide (OP), was found to be low (2-fold) in 2 Culex pipiens populations collected in Sayada (mid-eastern

Tunisia). This resistance was synergized by an esterase inhibitor (DEF). Two sets of over-produced esterases (A2-B2 and A4-B4), known to be involved in resistance, were identified in almost 50% of the examined insects. In addition, 3% of insects had an insensitive acetylcholinesterase. After selecting larvae of one of the samples (ES) with temephos for 6 generations, a 9-fold increase in resistance was observed, and all mosquitoes were found to carry esterases A2-B2 and an insensitive acetylcholinesterase. These results must be considered in future mosquito control programs, since 2 of the identified genes can lead to high resistance to several organophosphorous insecticides.

L43 ANSWER 55 OF 100 MEDLINE on STN

ACCESSION NUMBER: 1995076063 MEDLINE Full-text

DOCUMENT NUMBER: PubMed ID: 7984815

TITLE: [A biochemical method for the determination of the altered acetylcholinesterase which confers resistance to organophosphate and carbamate insecticides in *Culex quinquefasciatus* Say, 1823].

Metodo bioquimico para la determinacion de acetil colinesterasa modificada, que confiere resistencia cruzada a insecticidas organofosforados y carbamatos en *Culex quinquefasciatus* Say, 1823.

AUTHOR: Rodriguez Coto M; Bisset Lazcano J A; Diaz Pantoja C; Ortiz Losada E

CORPORATE SOURCE: Departamento de Control de Vectores, IPK.

SOURCE: Revista cubana de medicina tropical, (1993) Vol. 45, No. 2, pp. 122-7.

Journal code: 0074364. ISSN: 0375-0760. L-ISSN: 0375-0760.

PUB. COUNTRY: Cuba

DOCUMENT TYPE: (ENGLISH ABSTRACT)

Journal; Article; (JOURNAL ARTICLE)

LANGUAGE: Spanish

FILE SEGMENT: Priority Journals

ENTRY MONTH: 199501

ENTRY DATE: Entered STN: 16 Jan 1995

Last Updated on STN: 16 Jan 1995

Entered Medline: 3 Jan 1995

AB The application of a rapid technique to determine the frequency of the altered acetylcholinesterase gene which confers cross resistance to organophosphate and carbamate insecticides to mosquitoes, was tested. Laboratory strains of *Culex quinquefasciatus* Say, 1823 were used to apply this technique: A clear differentiation in absorbance values was attained among resistant susceptible homozygous mosquitoes (SS), heterozygous (RS); and homozygous (RR), with residual enzymatic activity values of 10-60; 70-100; and 80-120, respectively. This was clearly differentiated at first sight due to a change of the reaction's yellow color. The gene of the altered acetylcholinesterase was found in the *Culex quinquefasciatus* strains under study.

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ACCESSION NUMBER: 1993:297244 BIOSIS Full-text

DOCUMENT NUMBER: PREV199396015469

TITLE: Changes in malathion and pyrethroid resistance after cypermethrin selection of *Culex quinquefasciatus* field populations of Cuba.

AUTHOR(S): Rodriguez, M.; Ortiz, E.; Bisset, J. A.; Hemingway, J.
[Reprint author]; Saledo, E.

CORPORATE SOURCE: Parasite Vector Biochemistry Unit, Dep. Med. Parasitol.,
London Sch. Hygiene Tropical Med., Keppel Street, London
WC1E 7HT, UK

SOURCE: Medical and Veterinary Entomology, (1993) Vol. 7, No. 2,
pp. 117-121.
ISSN: 0269-283X.

DOCUMENT TYPE: Article

LANGUAGE: English

ENTRY DATE: Entered STN: 23 Jun 1993

Last Updated on STN: 24 Jun 1993

AB Use of the organophosphorus insecticide malathion for mosquito control in Cuba, for 7 years up to 1986, selected elevated non-specific esterase and altered acetylcholinesterase (AChE) resistance mechanisms in *Culex quinquefasciatus*. In central Havana space-spraying of malathion was replaced by the pyrethroid cypermethrin in 1987: alternate cycles of malathion and cypermethrin were applied in some of the more rural areas of Havana district during 1987-91. Consequently, populations of *C. quinquefasciatus* in the central area of Havana developed resistance to cypermethrin, but there is no evidence of pyrethroid resistance in the outlying areas. Malathion resistance levels declined significantly after 1986, measured both by bioassay and the frequency of the elevated esterase resistance mechanism, and then stabilized with no measurable decline during 1990 in any of the populations tested. These populations had less than 10% frequency of susceptible homozygotes for both the esterase and AChE resistance mechanisms, indicating that organophosphate resistance is still prevalent in Cuban *C. quinquefasciatus*. These two mechanisms appear to be in linkage equilibrium, suggesting that current selection for double resistance is not strong. In the central Havana region, pirimiphos-methyl, an organophosphorus insecticide unaffected by the two common malathion resistance mechanisms, is now being used in a resistance management strategy designed to avoid pyrethroid resistance spreading.

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ACCESSION NUMBER: 1993:364367 BIOSIS Full-text

DOCUMENT NUMBER: PREV199396050042

TITLE: Organophosphorus insecticide resistance in a new
strain of *Culex quinquefasciatus* (Diptera:
Culicidae) from Tanga, Tanzania.

AUTHOR(S): Khayrandish, A.; Wood, R. J. [Reprint author]

CORPORATE SOURCE: Manchester Univ., Dep. Environ. Biol., Williamson Building,
Manchester M13 9PL, UK

SOURCE: Bulletin of Entomological Research, (1993) Vol. 83, No. 1,
pp. 67-74.
CODEN: BERE2. ISSN: 0007-4853.

DOCUMENT TYPE: Article

LANGUAGE: English

ENTRY DATE: Entered STN: 6 Aug 1993

Last Updated on STN: 28 Sep 1993

AB Fourth instar larvae of a new strain of *Culex quinquefasciatus* Say from Tanzania (TANGA) were tested for insecticide resistance. Initially, the resistance ratio (RR) to chlorpyrifos was 41.8, to temephos 30.8, to propoxur 3.7. After 2-3 years of laboratory culture, resistance to chlorpyrifos and propoxur had declined (chlorpyrifos 5.7, 3.8; propoxur 1.9, permethrin 1.9). Significant synergism was found between s,s,s-tributyl trithiophosphate (DEF) and chlorpyrifos, reducing the RR from 8.0 to 2.5. Synergism between piperonyl butoxide and permethrin was less than in a susceptible control strain. Twelve esterase isozymes of different relative mobilities (Rm) on polyacrylamide gel electrophoresis were identified, ten of which remained when the strain was reinvestigated two years (approximately 32 generations) later.

Null activity for all but one of these bands was observed in some larvae. Four esterase bands (Rm 0.25, 0.27, 0.31, 0.34, designated A2, A3, B2, B3) showed polymorphism in activity, with very intense bands in some larvae. The mean frequency of bands with activity greater than standard, declined as organophosphorus (OP) resistance declined, but resistance was unconnected with the frequency of nulls at these positions. In mass larval assays of in vitro sensitivity of acetylcholinesterase (AChE) to propoxur, the I-50 exceeded 10 times 10⁻⁴M, compared with 0.1 times 10⁻⁴M in a reverted resistant strain (RANGOON). Single larval assays revealed heterogeneity, which was interpreted on the basis of an AChE resistance allele (Ace-R) with a frequency of 0.23.

L43 ANSWER 58 OF 100 MEDLINE on STN
 ACCESSION NUMBER: 1994025007 MEDLINE Full-text
 DOCUMENT NUMBER: PubMed ID: 8212105
 TITLE: A malaria control trial using insecticide-treated bed nets and targeted chemoprophylaxis in a rural area of The Gambia, west Africa. 3. Entomological characteristics of the study area.
 AUTHOR: Lindsay S W; Alonso P L; Armstrong Schellenberg J R; Hemingway J; Thomas P J; Shenton F C; Greenwood B M
 CORPORATE SOURCE: Medical Research Council Laboratories, Fajara, Banjul, The Gambia.
 SOURCE: Transactions of the Royal Society of Tropical Medicine and Hygiene, (1993 Jun) Vol. 87 Suppl 2, pp. 19-23.
 Journal code: 7506129. ISSN: 0035-9203. L-ISSN: 0035-9203.
 PUB. COUNTRY: ENGLAND: United Kingdom
 DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
 (RESEARCH SUPPORT, NON-U.S. GOV'T)
 LANGUAGE: English
 FILE SEGMENT: Priority Journals
 ENTRY MONTH: 199311
 ENTRY DATE: Entered STN: 17 Jan 1994
 Last Updated on STN: 17 Jan 1994
 Entered Medline: 18 Nov 1993

AB Baseline entomological surveillance was carried out in a rural area of The Gambia during the rainy season in 1988, one year before the implementation of a malaria control programme using insecticide-impregnated nets and targeted chemoprophylaxis in villages with a primary health care (PHC) system. Mosquito collections took place in 6 pairs of settlements each with untreated bed nets; within each pair there was a large PHC village with a resident village health worker (VHW) and traditional birth attendant (TBA) and a smaller non-PHC village without either a VHW or a TBA. The most common vectors in the study area were *Anopheles gambiae* sensu stricto and, to a lesser extent, *An. arabiensis*. These mosquitoes were found in appreciable numbers for at least 4 months of the year (geometric mean/bedroom/night = 32.5, 95% confidence interval 18.2-57.3). Numbers of mosquitoes collected in PHC villages or non-PHC villages were not significantly different. Greater numbers of mosquitoes were found in villages closer to the River Gambia than in those further away. Evidence for DDT resistance due to elevated glutathione S-transferase activity was found in one of the 12 villages, but there was no evidence of resistance to organophosphate or carbamate insecticides as suggested by the low esterase levels and carbamate sensitive acetylcholinesterase.

L43 ANSWER 59 OF 100 BIOSIS COPYRIGHT (c) 2010 The Thomson Corporation on STN
 ACCESSION NUMBER: 1993:185064 BIOSIS Full-text
 DOCUMENT NUMBER: PREV199395095514

TITLE: Changes in enzyme titres with age four geographical strains of *Aedes aegypti* and their association with insecticide resistance.

AUTHOR(S): Mourya, Devendra T.; Hemingway, Janet; Leake, Colin J.
CORPORATE SOURCE: Dep. Medical Entomology, Natl. Inst. Virology, 20-A, Dr Ambedkar Road, Pune 411 001, India

SOURCE: Medical and Veterinary Entomology, (1993) Vol. 7, No. 1, pp. 11-16.
ISSN: 0269-283X.

DOCUMENT TYPE: Article

LANGUAGE: English

ENTRY DATE: Entered STN: 9 Apr 1993

Last Updated on STN: 10 Apr 1993

AB The enzymes acetylcholinesterase, glutathione S-transferase (GST), glucose 6-phosphate dehydrogenase (G6PD), and general esterases were assayed in four strains of *Aedes aegypti* mosquitoes aged between 1 and 30 days. Microtitre plate methods were used to assay activity in the homogenates of individual mosquitoes. The levels of GST and G6PD declined with the age of the mosquitoes, while the activity for the other enzymes remained constant. Soluble protein content was also found to decline with mosquito age in all the strains. Insecticide bioassays showed that two strains (Trinidad and Virtudes) of *Ae. aegypti* were resistant to DDT, deltamethrin and malathion, whereas two other strains (Bangkok and Indian) were susceptible to all four classes of insecticides tested. Higher esterase activity levels in the resistant compared to the susceptible strains were assumed to be the cause of organophosphate resistance. The combination of DDT and deltamethrin resistance in two strains with normal GST and G6PD characteristics suggests that a *kdr*-type nerve insensitivity mechanism may be involved.

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ACCESSION NUMBER: 1993:191549 BIOSIS Full-text

DOCUMENT NUMBER: PREV199395101999

TITLE: Determination of insecticide susceptibility in *Culex quinquefasciatus* Say adults by rapid enzyme microassays.

AUTHOR(S): Lee, H. L. [Reprint author]; Abimbola, O.; Inder-Singh, K. [Reprint author]

CORPORATE SOURCE: Div. Med. Entomol., Inst. Med. Res., Jalan Pahang, 50588 Kuala Lumpur, Malaysia

SOURCE: Southeast Asian Journal of Tropical Medicine and Public Health, (1992) Vol. 23, No. 3, pp. 458-463.
CODEN: SJTMAK. ISSN: 0125-1562.

DOCUMENT TYPE: Article

LANGUAGE: English

ENTRY DATE: Entered STN: 9 Apr 1993

Last Updated on STN: 9 Jun 1993

AB Rapid enzyme microassays for the detection of resistance due to organophosphate and carbamate in individual field-collected strains of *Culex quinquefasciatus* adults were conducted. These tests allowed accurate differentiation by eye, on the basis of color changes of susceptible and resistant individuals. Two separate tests were conducted for the biochemical assays. In the insensitive acetylcholinesterase (AChE) test, acetylthiocholine iodide (ACTH) and 5, 5 - dithiobis - (2 - nitrobenzoic acid) (DTNB) were used as substrate and coupling agent, respectively. The resulting yellow chromophore indicated AChE activity. Test results showed that the color intensity decreased as increasing concentration of propoxur were added, thereby confirming the susceptibility of the enzyme to inhibitor. Assay of non-specific esterase however, indicated elevated levels which were

correlated with degree of malathion resistance. Electrophoretic data revealed the presence of 2 esterase bands in all strains. It was concluded that such a pattern was not contributory to malathion resistance in adults.

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ACCESSION NUMBER: 1993:123245 BIOSIS Full-text
DOCUMENT NUMBER: PREV199395067345
TITLE: Insecticide resistance gene frequencies in
Anopheles sacharovi populations of the Cukurova
plain, Adana Province, Turkey.
AUTHOR(S): Hemingway, J. [Reprint author]; Small, G. J.; Monro, A.;
Sawyer, B. V.; Kasap, H.
CORPORATE SOURCE: Parasite Vector Biochem. Unit, Dep. Med. Parasitol., London
Sch. Hyg. Trop. Med., Keppel St., Gower St., London WC1E
7HT, UK
SOURCE: Medical and Veterinary Entomology, (1992) Vol. 6, No. 4,
pp. 342-348.
ISSN: 0269-283X.
DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 27 Feb 1993
Last Updated on STN: 28 Feb 1993

AB In Turkey, the mosquito *Anopheles sacharovi* has been under field selection pressure sequentially with DDT, dieldrin, malathion and pirimiphosmethyl over a period of 30 years for the purpose of malaria control. In 1984, the field population of *An. sacharovi* in the malarious Cukurova plain of Adana Province contained an altered acetylcholinesterase-based resistance gene giving broad spectrum resistance against organophosphorus and carbamate insecticides. The cross-resistance spectrum from this mechanism conferred resistance to malathion but not to the organophosphorus insecticide pirimiphos-methyl. Over the 6 years that pirimiphos-methyl has been applied for malaria vector control in this area, the frequency of the altered acetylcholinesterase resistance gene has declined, although in 1989 and 1990 it was still present at measurable frequencies in *An. sacharovi* from Cukurova. In addition to the acetylcholinesterase resistance mechanism there is evidence of an increased level of glutathione S-transferase in some of the *An. sacharovi* populations tested. This is known to be correlated with DDT resistance in other anophelines. In Turkish *An. sacharovi*, DDT resistance and elevated glutathione S-transferase occur in the same populations at similar frequencies. The continued prevalence of resistance to DDT and dieldrin, long after the 1971 cessation of DDT spraying for malaria control in Turkey, suggests that the DDT resistance gene has insufficient reduced fitness associated with it to have been lost from the field population during the past two decades. The implications of the slow decline in resistance gene frequencies in this field population are discussed in relation to mathematical models for managing resistance.

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ACCESSION NUMBER: 1992:431283 BIOSIS Full-text
DOCUMENT NUMBER: PREV199294083408; BA94:83408
TITLE: A GENERALIZED APPROACH TO DETECTION OF ORGANOPHOSPHATE
RESISTANCE IN MOSQUITOES.
AUTHOR(S): BROGDON W G [Reprint author]; BEACH R F; BARBER A M;
CORDON-ROSALES C
CORPORATE SOURCE: MALARIA BRANCH F12, DIVISION PARASITIC DISEASES, CENTER
INFECTIOUS DISEASES, CENTERS DISEASE CONTROL, PUBLIC HEALTH

SERVICE, US DEP HEALTH HUMAN SERVICES, ATLANTA, GA 30333, USA

SOURCE: Medical and Veterinary Entomology, (1992) Vol. 6, No. 2, pp. 110-114.
ISSN: 0269-283X.

DOCUMENT TYPE: Article

FILE SEGMENT: BA

LANGUAGE: ENGLISH

ENTRY DATE: Entered STN: 22 Sep 1992
Last Updated on STN: 23 Sep 1992

AB Insecticide bioassays and biochemical microtiter assays were compared for detection of resistance to the organophosphate insecticides malathion and fenitrothion, using inbred laboratory strains of malaria vectors *Anopheles albimanus* Wiedemann, *An. arabiensis* Patton and *An. stephensi* Liston. With susceptible mosquitoes, the LT100 values determined from bioassays corresponded closely with times taken to abolish the activity of acetylcholinesterase activity in biochemical assays: approximately 2 h for malathion and 3 h for fenitrothion. Resistant strains of all three anophelines showed longer survival correlated with prolonged acetylcholinesterase activity. *An. albimanus* strains with insensitive acetylcholinesterase survived bioassays with discriminating doses of 1 h exposure to 5% malathion or 1% fenitrothion and were judged as resistant. It is concluded that enzyme-specific microassays provide a reliable means of detecting resistant individuals, with practical advantages over bioassays which do not reveal the resistance mechanism and require large numbers of healthy mosquitoes.

L43 ANSWER 63 OF 100 CAPLUS COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 1992:250450 CAPLUS Full-text

DOCUMENT NUMBER: 116:250450

ORIGINAL REFERENCE NO.: 116:42335a,42338a

TITLE: Molecular mode of action of annonins

AUTHOR(S): Londershausen, Michael; Leicht, Wolfgang; Lieb, Folker; Moeschler, Heinrich; Weiss, Hanns

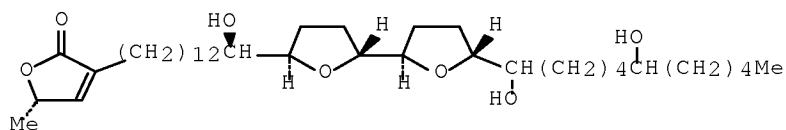
CORPORATE SOURCE: Crop Prot. Cent. Monheim, Bayer A.-G., Leverkusen, D-5090, Germany

SOURCE: Pesticide Science (1991), 33(4), 427-38
CODEN: PSSCBG; ISSN: 0031-613X

DOCUMENT TYPE: Journal

LANGUAGE: English

GI



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AB Exts. of ground seeds from *Annona squamosa* revealed interesting insecticidal properties. By an activity-monitored fractionation, different acetogenins, called annonins and annonacin, and including the novel annonin II (I) were determined to be the active components. The investigation of ATP-levels (at the LT50 value) in *Plutella xylostella* under treatment with annonin I and antimycin A revealed values of 1.45 and 1.35 $\mu\text{mol g}^{-1}$ fresh weight resp., whereas insecticides primarily

affecting neurotoxic targets, e.g. cyfluthrin (sodium channels; 2.25 µmol g⁻¹ fresh weight) or parathion (acetylcholinesterase; 2.0 µmol g⁻¹ fresh weight) did not influence the ATP-levels significantly (control; 1.98 µmol g⁻¹ fresh weight). Further studies on the target site of annonins revealed an inhibitory effect on the NADH-cytochrome c-reductase and complex I of insect mitochondria with IC₅₀ values of 4-8 nmol mg⁻¹ protein and 0.8 µM, resp., for annonin I. Similar results were observed for the inhibition of complex I from bovine heart muscle (IC₅₀: <0.1 µM) or *Neurospora crassa* cells (IC₅₀: 0.3 µM), whereas coupling sites II or III were not affected. Furthermore, annonins did not reveal any direct inhibition of oxidative phosphorylation or uncoupling effects.

OS.CITING REF COUNT: 70 THERE ARE 70 CAPLUS RECORDS THAT CITE THIS
RECORD (70 CITINGS)

L43 ANSWER 64 OF 100 SCISEARCH COPYRIGHT (c) 2010 The Thomson Corporation
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ACCESSION NUMBER: 1991:687008 SCISEARCH Full-text
THE GENUINE ARTICLE: GU724
TITLE: INSECT RESISTANCE TO INSECTICIDES -
MECHANISMS AND DIAGNOSIS
AUTHOR: PRICE N R (Reprint)
CORPORATE SOURCE: MAFF, CENT SCI LAB, LONDON RD, SLOUGH SL3 7HJ, BERKS,
ENGLAND (Reprint)
COUNTRY OF AUTHOR: ENGLAND
SOURCE: COMPARATIVE BIOCHEMISTRY AND PHYSIOLOGY C-PHARMACOLOGY
TOXICOLOGY & ENDOCRINOLOGY, (1991) Vol. 100, No. 3, pp.
319-326.
ISSN: 0742-8413.
PUBLISHER: PERGAMON-ELSEVIER SCIENCE LTD, THE BOULEVARD, LANGFORD
LANE, KIDLINGTON, OXFORD, ENGLAND OX5 1GB.
DOCUMENT TYPE: General Review; Journal
FILE SEGMENT: LIFE
LANGUAGE: English
REFERENCE COUNT: 46
ENTRY DATE: Entered STN: 1994
Last Updated on STN: 1994

L43 ANSWER 65 OF 100 BIOSIS COPYRIGHT (c) 2010 The Thomson Corporation on
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ACCESSION NUMBER: 1991:387771 BIOSIS Full-text
DOCUMENT NUMBER: PREV199192065086; BA92:65086
TITLE: MALATHION AND PYRETHROID RESISTANCE IN *CULEX*
-*QUINQUEFASCIATUS* FROM CUBA WEST INDIES EFFICACY OF
PIRIMIPHOS-METHYL IN THE PRESENCE OF AT LEAST THREE
RESISTANCE MECHANISMS.
AUTHOR(S): BISSET J A [Reprint author]; RODRIGUEZ M M; HEMINGWAY J;
DIAZ C; SMALL G J; ORITZ E
CORPORATE SOURCE: DEP MEDICAL PARASITOLOGY, LONDON SCHOOL HYGIENE TROPICAL
MEDICINE, KEPPEL STREET, GOWER STREET, LONDON WC1E 7HT, UK
SOURCE: Medical and Veterinary Entomology, (1991) Vol. 5, No. 2,
pp. 223-228.
ISSN: 0269-283X.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 27 Aug 1991
Last Updated on STN: 8 Oct 1991

AB Use of malathion for mosquito control in Cuba for 7 years up to 1986 has
selected for elevated non-specific esterase and altered acetylcholinesterase
(AChE) resistance mechanisms in populations of the pest mosquito *Culex*

quinquefasciatus Say. These mechanisms are still present in relatively high frequencies in the Havana area, despite the replacement of malathion by pyrethroid insecticides for the last 3 years in the mosquito control program. Samples of *Culex quinquefasciatus* populations from within a 100 km radius of Havana had high levels of resistance to malathion and lower levels of resistance to propoxur, but there was little or no cross-resistance to the organophosphorus insecticide pirimiphos-methyl. Selection with malathion for twenty-two consecutive generations in the laboratory increased the level of malathion resistance to 1208-fold and propoxur level to 1002-fold, but the maximum level of pirimiphos-methyl resistance was only 11-fold. Pirimiphos-methyl is still operationally effective, despite the resistance mechanisms segregating, so this insecticide if used for control is unlikely to select either of the known resistance factors directly in the field population. Since 1986, pyrethroids have been used extensively, and low levels of pyrethroid resistance were detected in two of five field population samples tested. Malathion selection did not increase the level of pyrethroid resistance, which indicates that one or more distinct pyrethroid resistance factors are now being selected in the field populations of *Culex quinquefasciatus*.

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ACCESSION NUMBER: 1991:365365 BIOSIS Full-text

DOCUMENT NUMBER: PREV199192053590; BA92:53590

TITLE: THE EFFICACY OF ACETYLCHOLINESTERASE IN
ORGANOPHOSPHORUS AND CARBAMATE RESISTANCE
IN CULEX-PIPIENS L. FROM ITALY.

AUTHOR(S): BONNING B C [Reprint author]; HEMINGWAY J

CORPORATE SOURCE: DEP MED PARASITOL, LONDON SCH HYGIENE AND TROPICAL MED,
KEPPEL ST, LONDON WC1E 7HT, ENGLAND, UK

SOURCE: Pesticide Biochemistry and Physiology, (1991) Vol. 40, No.
2, pp. 143-148.
CODEN: PCBPBS. ISSN: 0048-3575.

DOCUMENT TYPE: Article

FILE SEGMENT: BA

LANGUAGE: ENGLISH

ENTRY DATE: Entered STN: 13 Aug 1991

Last Updated on STN: 8 Oct 1991

AB In response to intensive use of organophosphorus insecticides against mosquitoes, resistance in *Culex pipiens* from Lucas, Italy, has increased, largely thwarting control efforts. In 1985, the field population was segregating for both altered acetylcholinesterase and elevated nonspecific esterase-based resistance mechanisms. Strains colonized in the laboratory at this time were selected for resistance or susceptibility to organophosphorus and carbamate insecticides. Microtiter plate assay analysis of genotypes was used to identify when strains had reached homozygosity for the altered acetylcholinesterase (AChE) mechanism of insecticide resistance. In Italian *C. pipiens*, the alteration the enzyme, AChE, associated with resistance had no significant effect on either the Km or Vmax values with the substrate acetylthiocholine iodide. In vitro measurement of bimolecular rate constants showed that the altered form of AChE was more insensitive to inhibition by certain insecticides, than the AChE variant in the line selected for susceptibility. The cross-resistance conferred by this mechanism to a number of organophosphorus and carbamate insecticides was determined by bioassay, the contribution of nonspecific esterase activity to insecticide resistance being quantified by use of a nonspecific esterase inhibitor. Altered AChE conferred greater resistance to carbamate than to organophosphorus insecticides, the contribution of nonspecific esterase activity being greater in resistance to the latter. Data indicated that a third resistance mechanism may be present

in this population conferring moderate levels of resistance to pirimiphos methyl and fenitrothion.

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ACCESSION NUMBER: 1991:137176 BIOSIS Full-text
DOCUMENT NUMBER: PREV199191073716; BA91:73716
TITLE: A POSSIBLE NOVEL LINK BETWEEN ORGANOPHOSPHORUS
AND DDT INSECTICIDE RESISTANCE GENES IN ANOPHELES
SUPPORTING EVIDENCE FROM FENITROTHION METABOLISM STUDIES.
AUTHOR(S): HEMINGWAY J [Reprint author]; MIYAMOTO J; HERATH P R
CORPORATE SOURCE: DEP MEDICAL PARASITOLOGY, LONDON SCHOOL HYGIENE TROPICAL
MEDICINE, KEPPEL STREET, LONDON WC1E 7HT, UK
SOURCE: Pesticide Biochemistry and Physiology, (1991) Vol. 39, No.
1, pp. 49-56.
CODEN: PCBPBS. ISSN: 0048-3575.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 14 Mar 1991
Last Updated on STN: 15 Mar 1991

AB Fenitrothion metabolism studies on a multiple organophosphorus resistant strain of *Anopheles subpictus* from Sri Lanka indicated that oxidases and glutathione S-transferases play a major role in the detoxication of this insecticide. The oxidases, as well as producing detoxication products, also produce two highly active acetylcholinesterase inhibitors, fenitrooxon and 3-hydroxymethyl fenitrooxon. Further metabolism studies on fenitrooxon indicated that the glutathione S-transferases in *A. subpictus* were able to detoxify these activation products. DDT resistance in the field population of *A. subpictus* has increased since 1983, although there has been no direct DDT selection pressure during this period. DDT resistance in this species is due to an increase in DDT dehydrochlorination which is correlated with an increase in glutathione S-transferase activity. It is possible that the same enzyme is responsible for both DDT and secondary organophosphate (fenitrothion) metabolism. If so, organophosphorus insecticide selection pressure will actively maintain, or select for, DDT resistance in this population. Linkage disequilibrium between the oxidase and glutathione S-transferase-based resistance genes would be expected if the same glutathione S-transferase fulfils both functions, and this is now being investigated in the field population in Sri Lanka.

L43 ANSWER 68 OF 100 CAPLUS COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 1991:444193 CAPLUS Full-text
DOCUMENT NUMBER: 115:44193
ORIGINAL REFERENCE NO.: 115:7573a,7576a
TITLE: Structure-activity studies of methanesulfonate
insecticides. V. Insecticidal and
antiacetylcholinesterase activities of
isobutylthioaryl methanesulfonates
AUTHOR(S): Kato, Shoichi; Kobayashi, Masuko; Masui, Akiko;
Ishida, Shuichi
CORPORATE SOURCE: Ageo Res. Lab., Nippon Kayaku Co., Ltd., Ageo, 362,
Japan
SOURCE: Nippon Noyaku Gakkaishi (1991), 16(1), 9-18
CODEN: NNGADV; ISSN: 0385-1559
DOCUMENT TYPE: Journal
LANGUAGE: English

AB Fifteen methanesulfonates of isobutylthio-substituted phenol and heterocyclic alcs. were synthesized and tested for their insecticidal activities toward 5 insect species and Tetranychus urticae. 3-Isobutylthiophenyl, 4- and 6-isobutylthio-2-pyridyl, 5-isobutylthio-3-pyridyl, 4-isobutylthio-2-pyridyl, 6-isobutylthio-2-pyrazinyl, and 2-isobutylthio-1,3-thiazol-4-yl methanesulfonates had high insecticidal activities toward Nephrotettix cincticeps and Nilaparvata lugens adults and Culex pipiens larvae, indicating that the isobutylthio group must be at the β (meta) position to the MeS(O)2O group for the high activity. Isobutylsulfinyl and isobutylsulfonyl analogs of these highly insecticidal isobutylthio-substituted Ph and heterocyclic methanesulfonates had high inhibitory activities toward acetylcholinesterase from N. cincticeps whole body, housefly head, and bovine erythrocytes.

L43 ANSWER 69 OF 100 BIOSIS COPYRIGHT (c) 2010 The Thomson Corporation on STN

ACCESSION NUMBER: 1991:294099 BIOSIS Full-text
DOCUMENT NUMBER: PREV199192015114; BA92:15114
TITLE: INTERACTION OF INSECTICIDE RESISTANCE GENES IN FIELD POPULATIONS OF CULEX-PIPIENS DIPTERA CULICIDAE FROM ITALY IN RESPONSE TO CHANGING INSECTICIDE SELECTION PRESSURE.
AUTHOR(S): BONNING B C [Reprint author]; HEMINGWAY J; ROMI R; MAJORI G
CORPORATE SOURCE: DEP MED PARASITOL, LONDON SCH HYGIENE AND TROPICAL MED, KEPPEL ST, LONDON WC1E 7HT, UK
SOURCE: Bulletin of Entomological Research, (1991) Vol. 81, No. 1, pp. 5-10.
CODEN: BERE2. ISSN: 0007-4853.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 25 Jun 1991
Last Updated on STN: 13 Aug 1991

AB Culex pipiens Linnaeus larvae were collected from various locations in Italy and colonized as separate strains. These were analysed for elevated non-specific esterase activity and frequency of altered acetylcholinesterase (AChE) mechanism of insecticide resistance, and bioassayed, to define the cross-resistance spectra conferred by these to organophosphorus and carbamate insecticides. These mechanisms were further characterized by polyacrylamide gel electrophoresis. Elevated esterase A1 (formerly known as Est 3A) which predominated in C. pipiens from Italy in 1985 had been replaced by two esterases, A2 and B2. Altered acetylcholinesterase was still present at high frequencies. Altered and normal acetylcholinesterase were distinguished by differential mobility on polyacrylamide gel electrophoresis. Levels of insecticide resistance were higher in the Lucca region of Italy than in other areas sampled, in response to intensive use of tempephos and to a lesser extent chloropyrifos, employed to reduce mosquito biting nuisance to tourists in this area.

L43 ANSWER 70 OF 100 MEDLINE on STN DUPLICATE 20

ACCESSION NUMBER: 1991123541 MEDLINE Full-text
DOCUMENT NUMBER: PubMed ID: 2280047
TITLE: Microplate adaptation of Gomori's assay for quantitative determination of general esterase activity in single insects.
AUTHOR: Dary O; Georghiou G P; Parsons E; Pasteur N
CORPORATE SOURCE: Department of Entomology, University of California, Riverside 92521.
SOURCE: Journal of economic entomology, (1990 Dec) Vol. 83, No. 6,

pp. 2187-92.

Journal code: 2985127R. ISSN: 0022-0493. L-ISSN: 0022-0493.

PUB. COUNTRY: United States
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
(RESEARCH SUPPORT, NON-U.S. GOV'T)
(RESEARCH SUPPORT, U.S. GOV'T, NON-P.H.S.)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199103
ENTRY DATE: Entered STN: 5 Apr 1991
Last Updated on STN: 5 Apr 1991
Entered Medline: 14 Mar 1991

AB Esterase activity is monitored in mosquitoes and other arthropod species because high levels of these enzymes can be associated with pesticide resistance. In the 1950s, G. Gomori devised a colorimetric method to detect esterase activity based on their capacity to hydrolyze aryl-esters. We modified this method for use in microtiter plates. Mosquito homogenates (*Culex quinquefasciatus* Say and *C. pipiens* L.) from strains susceptible and resistant to insecticides were allowed to hydrolyze alpha-naphthyl acetate in the presence of Triton X-100 and a specific acetylcholinesterase inhibitor. The alpha-naphthol product was detected colorimetrically by a diazo-coupling reaction with Fast Garnet GBC salt. Triton X-100 improved the extraction of esterases and maintained the azo compound in solution. The linear range of the method was 2-20 nmoles of alpha-naphthol; this high sensitivity permitted accurate determinations in 1/30 portions of single adult mosquitoes from the strain with the lowest esterase activity. To avoid variations due to changes in temperature and duration of assay, results were normalized to equivalent enzyme activity units obtained in a spectrophotometer at 25 degrees C. Depending on the number of homogenate dilutions required, performance of the assay in microplates allowed the simultaneous analysis of 20-80 samples. Female mosquitoes showed higher enzyme activity than males when expressed in nmoles/min per mosquito, but differences were reduced when results were expressed as specific activity (nmoles/min per mg protein). A mosquito strain resistant to organophosphates due to the presence of high levels of esterases showed about 200 times more esterase activity than a susceptible strain or a strain resistant due to insensitive acetylcholinesterase.

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ACCESSION NUMBER: 1990:476763 BIOSIS Full-text
DOCUMENT NUMBER: PREV199090116183; BA90:116183
TITLE: MECHANISMS OF ORGANOPHOSPHATE AND CARBAMATE
RESISTANCE IN CULEX-QUINQUEFASCIATUS FROM SAUDI
ARABIA.

AUTHOR(S): HEMINGWAY J [Reprint author]; CALLAGHAN A; AMIN A M
CORPORATE SOURCE: DEP MED PARASITOL, LONDON SCH HYGIENE AND TROPICAL MED,
KEPPEL ST, LONDON WC1E 7HT, UK
SOURCE: Medical and Veterinary Entomology, (1990) Vol. 4, No. 3,
pp. 275-282.
ISSN: 0269-283X.

DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 25 Oct 1990
Last Updated on STN: 25 Oct 1990

AB Broad spectrum organophosphate resistance in *Culex quinquefasciatus* Say from Saudi Arabia is inherited as a semi-dominant characteristic. The resistance has a metabolic basis and confers cross-resistance against the carbamate propoxur. Organophosphate-selected strains contain two elevated esterases with

the same electrophoretic mobilities as those in resistant Cx quinquefasciatus from Sri Lanka and a range of African locations. Alteration in the sensitivity of acetylcholinesterase to insecticide inhibition does not play a major role in resistance. There was a significant increase in the amount of Cytochrome P450 in Cx quinquefasciatus lines selected with the pyrethroid permethrin or with the organophosphate pirimiphos-methyl, but no change in lines selected with five other organophosphates or propoxur, compared to the parental strain, which suggests that oxidases are involved in the P450 mediated resistance to both permethrin and pirimiphos-methyl.

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ACCESSION NUMBER: 1991:25364 BIOSIS Full-text
DOCUMENT NUMBER: PREV199191014715; BA91:14715
TITLE: THE MECHANISMS OF ORGANOPHOSPHATE AND CARBAMATE
RESISTANCE IN CULEX-QUINQUEFASCIATUS DIPTERA
CULICIDAE FROM CUBA WEST INDIES.
AUTHOR(S): BISSET J A [Reprint author]; RODRIGUEZ M M; DIAZ C; ORTIZ
E; MARQUETTI M C; HEMINGWAY J
CORPORATE SOURCE: DE MED PARASITOL, LONDON SCH HYGIENE AND TROPICAL MED,
KEPPEL ST, LONDON WC1E 7HT, UK
SOURCE: Bulletin of Entomological Research, (1990) Vol. 80, No. 3,
pp. 245-250.
CODEN: BERE2. ISSN: 0007-4853.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 3 Jan 1991
Last Updated on STN: 30 Jan 1991

AB Two field-collected strains of Culex quinquefasciatus Say, collected 50 km apart in Havana City, Cuba, were both resistant to malathion and propoxur, while one population also showed low level resistance to temephos. Laboratory selection of the latter population with malathion for 22 generations increased the malathion resistance 1050-fold, temephos resistance 24-fold and propoxur resistance 453-fold compared to the standard laboratory susceptible strain. Synergist studies and biochemical tests indicated that two mechanisms, an elevated esterase and an insensitive acetylcholinesterase, were operative in these strains. The esterase mechanism conferred resistance to malathion, but not to temephos or propoxur. The acetylcholinesterase mechanism increased the level of malathion resistance and extended the cross-resistance spectrum to temephos and propoxur.

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ACCESSION NUMBER: 1990:413171 BIOSIS Full-text
DOCUMENT NUMBER: PREV199090073972; BA90:73972
TITLE: ACETYLCHOLINESTERASE ACTIVITY IN
ORGANOPHOSPHORUS AND CARBAMATE RESISTANT
AND SUSCEPTIBLE STRAINS OF THE CULEX-PIPIENS
COMPLEX.
AUTHOR(S): TANG Z-H [Reprint author]; WOOD R J; CAMMACK S L
CORPORATE SOURCE: INST ENTOMOL, ACAD SINICA, SHANGHAI, CHINA
SOURCE: Pesticide Biochemistry and Physiology, (1990) Vol. 37, No.
2, pp. 192-199.
CODEN: PCBPBS. ISSN: 0048-3575.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH

ENTRY DATE: Entered STN: 17 Sep 1990
Last Updated on STN: 17 Sep 1990

AB In vitro studies of acetylcholinesterase (AChE) activity and inhibition by insecticides have been carried out on larvae of four strains of mosquitoes of the *Culex pipiens* complex, two of which (MSE, DAR/D) were resistant to both carbamates and organophosphorus (OP) compounds, one (RANGOON) resistant only to OPs and the other (CfCA) susceptible to both. Activity of AChE in MSE was substantially lower than in CfCA and DAR/D while in RANGOON it was intermediate. The AChE of MSE was much less sensitive than other strains to inhibition by the carbamates propoxur and carbaryl and the OPs paraoxon and fenthion (I50 ratios with CfCA: > 1250, > 500, > 10000, > 11.1). Resistance to propoxur in MSE and DAR/D was high (LC50 ratios with CfCA: MSE > 667; DAR/D = 2133) but resistance in both strains was unstable and declined when laboratory selection was relaxed. It is concluded (a) that resistance to carbamates and OPs in larvae of the MSE strain is associated with a mutant form of AChE or broad insensitivity, (b) that resistance to OPs in RANGOON is possibly associated with a change in AChE giving specific insensitivity to fenthion, and (c) that resistance to carbamates and OPs in DAR/D is not explained by a change in AChE. The basis of resistance in these strains is discussed in relation to metabolic studies and the pattern of insecticide use in the field.

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ACCESSION NUMBER: 1990293201 EMBASE Full-text
TITLE: Chromosomal organization of the amplified esterase B1 gene in organophosphate-resistant *Culex pipiens quinquefasciatus* say (Diptera, Culicidae).
AUTHOR: Nance, E.; Heyse, D.; Britton-Davidian, J.; Pasteur, N.
CORPORATE SOURCE: Institut des sciences de l'evolution, unite associee 327, Universite de montpellier II, Case postale 064, 34060 Montpellier, France.
SOURCE: Genome, (1990) Vol. 33, No. 1, pp. 148-152.
ISSN: 0831-2796 CODEN: GENOE3
COUNTRY: Canada
DOCUMENT TYPE: Journal; Article
FILE SEGMENT: 002 Physiology
021 Developmental Biology and Teratology
022 Human Genetics
029 Clinical and Experimental Biochemistry
046 Environmental Health and Pollution Control
052 Toxicology
LANGUAGE: English
SUMMARY LANGUAGE: English
ENTRY DATE: Entered STN: 13 Dec 1991
Last Updated on STN: 13 Dec 1991

AB In *Culex pipiens quinquefasciatus* from California, high resistance to organophosphorus insecticides is due to an increased production of the detoxifying esterase B1 resulting from a 250-fold amplification of the structural gene. The chromosomal organization of this amplified gene was studied by in situ hybridization techniques. Esterase B1 gene copies were found to be clustered on a single chromosome, tentatively identified as chromosome II.

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ACCESSION NUMBER: 1990:110201 BIOSIS Full-text
DOCUMENT NUMBER: PREV199089059692; BA89:59692

TITLE: PSEUDO-TYPE ACETYLCHOLINESTERASE FROM
INSECTICIDE-RESISTANT CULEX-TRITAENIORHYNCHUS.
AUTHOR(S): WATANABE M [Reprint author]; TAKEBE S; KIM D-H; KOBASHI K;
ARAKAWA R; KAMIMURA K
CORPORATE SOURCE: TOYAMA INST HEALTH, NAKATAIKOYAMA 17-1, KOSUGI-MACHI,
TOYAMA 939-03, JPN
SOURCE: Eisei Kagaku, (1989) Vol. 35, No. 6, pp. 479-482.
CODEN: ESKGA2. ISSN: 0013-273X.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 21 Feb 1990
Last Updated on STN: 22 Feb 1990

AB Acetylcholinesterases (AChEs) were extracted with Triton X-100 from the head and thorax (organophosphorus insecticide-resistant (R) and susceptible (S) strains of *Culex tritaeniorhynchus*, and purified by high performance liquid chromatography with a DEAE-cellulose column. Both AChE (R) and (S) hydrolyzed acetylcholine with similar specific activities of 5.34 and 6.84 $\mu\text{mol}/\text{min}/\text{mg}$ protein, respectively. Hydrolysis of benzoylcholine by both enzymes was one-seventh less than that of acetylcholine. When acetylthiocholine was used as substrate, the specific activity of AChE (R) (3.37 $\mu\text{mol}/\text{min}/\text{mg}$ protein) was lower than that of AChE(S) (11.6 $\mu\text{mol}/\text{min}$ mg protein). This tendency in acetylthiocholine was observed in other thiocholinesters such as propionyl and butyrylthiocholine. The inhibitory power of neostigmine to AChE(R) was 1/4000 lower than that to AChE(S), and the inhibitory powers of fenitrooxon and malaoxon to AChE(R) were also 1/1000 and 1/80 lower than those to AChE(S). Moreover, the inhibitory power of BW 284 to AChE(R) was also lower than that to AChE(S). However, BPA was more inhibitory to AChE(R) than (S). These results suggest that AChE(R) is modified at the binding site of known inhibitors of true AChE and becomes a pseudo-type of AChE when mosquitoes acquire resistance to organophosphorus insecticides.

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ACCESSION NUMBER: 1990:196242 BIOSIS Full-text
DOCUMENT NUMBER: PREV199089102913; BA89:102913
TITLE: INSECTICIDAL RESISTANCE OF CULEX
-TRITAENIORHYNCHUS IN CHINEN OKINAWA PREFECTURE JAPAN WITH
SPECIAL REFERENCE TO THE MECHANISM OF
PYRETHROID-RESISTANCE.
AUTHOR(S): YASUTOMI K [Reprint author]; TAKAHASHI M
CORPORATE SOURCE: DEP MED ENTOMOLOGY, NATL INST HEALTH, SHINAGAWA-KU, TOKYO
141, JAPAN
SOURCE: Medical Entomology and Zoology, (1989) Vol. 40, No. 4, pp.
315-322.
CODEN: ESDBAK. ISSN: 0424-7086.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: JAPANESE
ENTRY DATE: Entered STN: 24 Apr 1990
Last Updated on STN: 31 May 1990

AB *Culex tritaeniorhynchus* mosquitoes collected at Chinen Village, Okinawa, in 1987 and colonized in the laboratory were treated for resistance to insecticides. High resistance levels of the Chinen strain to organophosphorus (OP) and carbamate insecticides were similar to those of 16 samples in the 1984 country-wide survey in which no material from Okinawa was included. Extremely high levels of resistance to malathion and temefos were observed in the Chinen strain; the resistance ratio in larvae was about 10,000 for

malathion and >125,000 for temefos. However, the Chinen strain was less resistant to fenitrothion, fenthion, and carbamates than the mosquitoes tested in 1984. The electrophoretic analysis indicated that the Chinen strain showed higher activity of carboxylesterases which hydrolyze β -naphthyl acetate than in the susceptible (Taiwan) strain. Therefore, the enhanced carboxylesterase activity was estimated to be a mechanism of OP resistance in the Chinen strain, although the role of acetylcholinesterases has not been analyzed. The Chinen strain was also resistant to pyrethroids with the resistance ratios of 50-1,000 for larvae. This finding was contrary to the results in the 1984 survey. When piperonyl butoxide was applied, LC50's of permethrin and cypermethrin for Chinen larvae were decreased by 1/3 and 1/23, respectively, but a considerable difference between LC50's for Chinen and Taiwan larvae remained in each of these pyrethroids. This indicates mfo's are not major factors regulating pyrethroid resistance in the Chinen strain. Application of an inhibitor of DDT-dehydrochlorinase (DMC) and an inhibitor of mfo's (sesamex) did not affect the LC50 of DDT for Chinen larvae. Experimental crosses of the Chinen strain with the susceptible (Taiwan and e ma) strains showed that pyrethroid resistance of the Chinen strain is regulated by genetically recessive factor(s). This indicates that kdr-like factor(s) might participate in resistance of this strain to pyrethroids and DDT.

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ACCESSION NUMBER: 1989:317774 BIOSIS Full-text
DOCUMENT NUMBER: PREV198988031504; BA88:31504
TITLE: MICROPLATE ASSAY ANALYSIS OF THE DISTRIBUTION OF ORGANOPHOSPHATE AND CARBAMATE RESISTANCE IN GUATEMALAN ANOPHELES-ALBIMANUS.
AUTHOR(S): BROGDON W G [Reprint author]; BEACH R F; STEWART J M; CASTANAZA L
CORPORATE SOURCE: CENTERS DISEASE CONTROL, ATLANTA, GA 30333, USA
SOURCE: Boletin de la Oficina Sanitaria Panamericana, (1989) Vol. 106, No. 2, pp. 139-152.
CODEN: BOSPA8. ISSN: 0030-0632.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: SPANISH
ENTRY DATE: Entered STN: 30 Jun 1989
Last Updated on STN: 30 Jun 1989

AB Simple microplate assay methods for determining the frequency of insecticide resistance in single mosquitoes were used to study the distribution and localization of organophosphate and carbamate resistance in field populations of *Anopheles albimanus* Weidemann in Guatemala, where such resistance, caused by heavy use of agricultural pesticides, has long been assumed to be widespread. Areas of complete susceptibility to organophosphates and carbamates were observed, as well as areas where the resistant phenotypes represented up to 98% of the population. Overall, the resistance levels were lower and more localized than expected. Two mechanisms of resistance were identified by the microassay methods. These were the elevated esterase (nonspecific esterase) and insensitive acetylcholinesterase mechanisms which were selected independently, the former (documented for the first time in Central American anophelines) being predominant. These methods represent a promising new technology for the detection and assessment of resistance and will facilitate improved control strategy decisions.

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ACCESSION NUMBER: 1990:87823 BIOSIS Full-text

DOCUMENT NUMBER: PREV199089047174; BA89:47174
TITLE: ON THE MECHANISM OF DIPTEREX RESISTANCE IN CULEX
-PIPIENS-PALLENS COQ.
AUTHOR(S): HUANG G [Reprint author]; HUANG P-J
CORPORATE SOURCE: SHANGHAI INSTITUTE ENTOMOLOGY, ACADEMIA SINICA, SHANGHAI
SOURCE: Acta Entomologica Sinica, (1989) Vol. 32, No. 1, pp. 44-51.
CODEN: KCHPA2. ISSN: 0454-6296.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: CHINESE
ENTRY DATE: Entered STN: 9 Feb 1990
Last Updated on STN: 1 Apr 1990

AB The activity of acetylcholinesterase (AChE) in the female adults of the susceptible strain (SEN) and resistant strain (RD) of *Culex pipiens pallens* Coq. was determined. By comparing the values of Km and Vmax of the enzymic activity in the two strains, we draw the following conclusions: The head AChE is structurally different from the thoracic AChE in the both strains. Structural difference exists also in the head AChE of RD and SEN, but not in the thoracic AChE of the two strains. The Vmax of the head AChE activity of RD is about two times higher than that of SEN, but that of thoracic AChE of RD is only half that of SEN. Therefore the major mechanism of resistance towards organic phosphorus insecticides of RD resides in the structural and quantitative variation in the head AChE. The RD has an acid phosphatase activity equal to that of the SEN, but it contains the enzyme malthion-carboxylesterase which displays the following two characteristics: (1) It can hydrolyze malathion and other compounds containing carboxylic bond but not phosphatester bond. (2) It contributes to the resistance of RD towards the insecticides by its absorptive effect. These characteristics make the resistance of the RD belong to the weak type. Therefore the enzyme does not play a major role in the resistance mechanism of that strain.

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ACCESSION NUMBER: 1989:201435 BIOSIS Full-text
DOCUMENT NUMBER: PREV198987102339; BA87:102339
TITLE: CHEMICAL STRUCTURES AND INSECTICIDAL ACARICIDAL ACTIVITIES
OF 6-ALKYLTHIO-2-PYRIDYLALKANESULFONATES.
AUTHOR(S): KATO S [Reprint author]; MASUI A; ISHIDA S
CORPORATE SOURCE: AGEO RES LAB, AGROCHEMICALS DIV, FINE CHEM GROUP, NIPPON
KAYAKU CO LTD, KOSHIKIYA, AGEO 362, JPN
SOURCE: Journal of Pesticide Science, (1989) Vol. 14, No. 1, pp.
11-22.
CODEN: NNGADV. ISSN: 0385-1559.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 20 Apr 1989
Last Updated on STN: 20 Apr 1989

AB 6-Alkylthio-2-pyridyl alkanesulfonates, and their sulfoxides and sulfones were synthesized, and their lethal activity was tested to five species of insects and mites [*Nephotettix cincticeps*, *Nilaparvata lugens*, *Plutella xylostella*, *Culex pipiens*, *Tetranychus urticae*.] Methanesulfonates, with 6-alkyl-thio, -sulfinyl and -sulfonyl substituents having one to six carbon atoms, showed remarkable insecticidal activity to *Nephotettix cincticeps*, *Nilaparvata lugens* and *Culex pipiens*. Insecticidal activity of 6-alkylthio-2-pyridyl methanesulfonates to strains of *Nephotettix cincticeps* susceptible and resistant to organophosphates and carbamates was related parabolically to the hydrophobicity of the molecule, the optimum alkyl-thio substituents being C3.sbd.C4 alkyl groups. In a series of 67-iso-butylthio-2-pyridyl

alkanesulfonates and their sulfoxides and sulfones, the methane-, ethane- and chloromethane-sulfonates showed stronger insecticidal activity than higher alkanesulfonates. The 6-n-propyl-sulfinyl-, -sulfonyl-, 6-iso-butyl-sulfinyl- and -sulfonyl-2-pyridyl methanesulfonates and the 6-iso-butylsulfonyl-substituted ethanesulfonate showed strong inhibitory activity against acetylcholinesterase preparations from the susceptible and resistant strains of *Nephotettix cincticeps*.

L43 ANSWER 80 OF 100 MEDLINE on STN DUPLICATE 21
ACCESSION NUMBER: 1992103257 MEDLINE Full-text
DOCUMENT NUMBER: PubMed ID: 2519652
TITLE: Rapid microtitre plate test distinguishes insecticide resistant acetylcholinesterase genotypes in the mosquitoes *Anopheles albimanus*, *An. nigerrimus* and *Culex pipiens*.
AUTHOR: Ffrench-Constant R H; Bonning B C
CORPORATE SOURCE: Department of Entomology, London School of Hygiene and Tropical Medicine.
SOURCE: Medical and veterinary entomology, (1989 Jan) Vol. 3, No. 1, pp. 9-16.
Journal code: 8708682. ISSN: 0269-283X. L-ISSN: 0269-283X.
PUB. COUNTRY: ENGLAND: United Kingdom
DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
(RESEARCH SUPPORT, NON-U.S. GOV'T)
LANGUAGE: English
FILE SEGMENT: Priority Journals
ENTRY MONTH: 199202
ENTRY DATE: Entered STN: 2 Mar 1992
Last Updated on STN: 2 Mar 1992
Entered Medline: 12 Feb 1992

AB A rapid method of distinguishing insecticide insensitive acetylcholinesterase (AChE) genotypes was applied to three species of mosquitoes. This relies on comparing rates of an AChE mediated reaction in the presence and absence of insecticides which are inhibitors, using a kinetic microtitre plate reader. Clearer and more rapid resolution between genotypes was achieved than with previous assays which measure the amount of product formed at a fixed end-point. Results are presented for the F1s from crossing resistant and susceptible *Anopheles albimanus* Wiedemann and *Culex pipiens* L., for a strain of *An. albimanus* with a translocation linking the AChE gene to the Y chromosome and for field collected *An. nigerrimus* Giles. Propoxur and malaoxon were used as inhibitors. In all three species the enzyme was more insensitive to propoxur than malaoxon. Susceptible enzymes in all species also showed higher uninhibited AChE activity than their resistant counterparts. Presentation of both inhibited and uninhibited activities side by side may be useful to identify insects likely to be misclassified due to abnormally low AChE activities. Estimated frequencies of the three resistance genotypes in field populations of *An. nigerrimus* conformed to Hardy-Weinberg ratios. The implications of this technique for laboratory and field studies on insects are discussed.

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ACCESSION NUMBER: 1988:459610 BIOSIS Full-text
DOCUMENT NUMBER: PREV198886101329; BA86:101329
TITLE: MICROPLATE ASSAY ANALYSIS OF THE DISTRIBUTION OF ORGANOPHOSPHATE AND CARBAMATE RESISTANCE IN GUATEMALAN ANOPHELES-ALBIMANUS.
AUTHOR(S): BROGDON W G [Reprint author]; BEACH R F; STEWART J M;

CORPORATE SOURCE: CASTANAZA L
MALARIA BRANCH, DIV PARASITIC DIS, CENT INFECT DIS, CENT
DIS CONTROL, ATLANTA, GA 30333, USA
SOURCE: Bulletin of the World Health Organization, (1988) Vol. 66,
No. 3, pp. 339-346.
ISSN: 0042-9686.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 18 Oct 1988
Last Updated on STN: 18 Oct 1988

AB Simple microplate assay methods for determining the frequency of insecticide resistance in single mosquitos were used to study the distribution and localizaition of organophosphate and carbamate resistance in field populations of *Anopheles albimanus* Weidemann in Guatemala, where such resistance, caused by heavy use of agricultural pesticides, has long been assumed to be widespread. Areas of complete susceptibility to organophosphates and carbamates were observed, as well as areas where the resistant phenotypes represented up to 98% of the population. Overall, the resistance levels were lower and more localized than expected. Two mechanisms of resistance were identified by the microassay methods. These were the elevated esterase (nonspecific esterase) and insensitive acetylcholinesterase mechanisms which were selected independently, the former (documented for the first time in Central American anophelines) being predominant. These methods represent a promising new technology for the detection and assessment of resistance and will facilitate improved control strategy decisions.

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ACCESSION NUMBER: 1988:178728 BIOSIS Full-text
DOCUMENT NUMBER: PREV198885090830; BA85:90830
TITLE: OXO-TYPE ORGANOPHOSPHATE-RESISTANT
ACETYLCHOLINESTERASE FROM
ORGANOPHOSPHATE-UNSUSCEPTIBLE CULEX
-TRITAENIORHYNCHUS.
AUTHOR(S): WATANABE M [Reprint author]; TAKEBE S; KIM D-H; ARAKAWA R;
KAMIMURA K; KOBASHI K
CORPORATE SOURCE: FAC PHARMACEUTICAL SCI, TOYAMA MED AND PHARMACEUTICAL UNIV,
2630 SUGITANI, TOYAMA-SHI 930-01, JPN
SOURCE: Chemical and Pharmaceutical Bulletin (Tokyo), (1988) Vol.
36, No. 1, pp. 312-315.
CODEN: CPBTAL. ISSN: 0009-2363.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 11 Apr 1988
Last Updated on STN: 11 Apr 1988

AB A highly resistant strain of *Culex tritaeniorhynchus* was employed to clarify the mechanisms of the acquired resistance of mosquitoes to organophosphorus and carbamate insecticides by an enzymological approach. Carboxylesterase (CE) activity was higher in the abdomen than in the head and thorax, and was higher in every part of the body of the resistant strain as compared with the susceptible strain. Acetylcholinesterase (AChE) activity was high in the head, and was higher in every part of the body in the susceptible strain as compared with the resistant strain. Greater inhibition of CE by oxo-type organophosphorus insecticides was observed in the susceptible strain (11-, 8.2- and 22.3-fold greater inhibitions by fenitrooxon, malaoxon and dichlorvos, respectively) than in the resistant strain. Much stronger inhibition of AChE was observed in the susceptible strain (1227-, 76.5- and 183-fold inhibitions

by fenitrooxon, malaoxon and dichlorvos, respectively) than in the resistant strain. These results suggest that both AChE and CE are involved in the development of the acquired resistance to organophosphorus and carbamate insecticides, and that the former enzyme plays the major role.

L43 ANSWER 83 OF 100 LIFESCI COPYRIGHT 2010 CSA on STN DUPLICATE 22

ACCESSION NUMBER: 88:21581 LIFESCI Full-text
TITLE: Experimental selection for insecticide resistance.
AUTHOR: Brown, T.M.; Payne, G.T.
CORPORATE SOURCE: Dep. Entomol., Clemson Univ., Clemson, SC 29631, USA
SOURCE: J. ECON. ENTOMOL., (1988) vol. 81, no. 1, pp. 49-56.
DOCUMENT TYPE: Journal
FILE SEGMENT: Z
LANGUAGE: English
SUMMARY LANGUAGE: English

AB Experimental selection of insect cultures with insecticides to develop resistance in the laboratory is reviewed. *Aedes*, *Culex*, *Musca*, and *Heliothis* are considered because they are the insect genera most commonly used in experimental selection. When the rates at which resistance developed are compared, resistance to the axonic poisons DDT and permethrin is found to have developed more rapidly than resistance to malathion, parathion, and other acetylcholinesterase inhibitors. The degree to which resistance developed in the laboratory was usually equaled or exceeded in field collections within one decade of the laboratory experiments.

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ACCESSION NUMBER: 1988:248796 BIOSIS Full-text
DOCUMENT NUMBER: PREV198885127198; BA85:127198
TITLE: INSECTICIDAL RESISTANCE OF CULEX
-TRITAENIORHYNCHUS DIPTERA CULICIDAE IN JAPAN A
COUNTRY-WIDE SURVEY OF RESISTANCE TO INSECTICIDES
.
AUTHOR(S): YASUTOMI K [Reprint author]; TAKAHASHI M
CORPORATE SOURCE: DEP MED ENTOMOL, NATL INST HEALTH, SHINAGAWAKU, TOKYO, JPN
SOURCE: Journal of Medical Entomology, (1987) Vol. 24, No. 6, pp. 604-608.
CODEN: JMENA6. ISSN: 0022-2585.

DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 16 May 1988
Last Updated on STN: 16 May 1988

AB Sixteen samples of *Culex tritaeniorhynchus* Giles collected in 14 prefectures in Japan in 1984 were assessed for resistance to insecticides. All of the samples were highly resistant to organophosphorus (OP) and carbamate insecticides, but none was resistant to a pyrethroid (permethrin). Resistance levels for each of the OP's and carbamates were similar among samples except for diazinon and temephos. Considerable variation in LC50's of temephos may have resulted from exposure to other OP's used for crop protection because temephos has not been used in ricefields in Japan. A uniform susceptibility to permethrin accorded with lack of a history of pyrethroids as agrochemicals. Insensitivity of acetylcholinesterases (AChE's) was the principal factor regulating resistance to OP's. Mosquitoes with such insensitive AChE's began to appear in ca. 1978 and rapidly replaced most of the susceptible mosquitoes within 2 or 3 yr. Since 1980 *C. tritaeniorhynchus* has become more abundant, and some resurgence in human cases of Japanese encephalitis has occurred at the same time. However, a recurrence of an

epidemic of the magnitude of those experienced in the 1960's is implausible because of changes in agriculture and demography.

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ACCESSION NUMBER: 1988:248795 BIOSIS Full-text
DOCUMENT NUMBER: PREV198885127197; BA85:127197
TITLE: INSECTICIDAL RESISTANCE OF CULEX
-TRITAENIORHYNCHUS DIPTERA COLICIDAE IN JAPAN
GENETICS AND MECHANISMS OF RESISTANCE TO
ORGANOPHOSPHORUS INSECTICIDES.
AUTHOR(S): TAKAHASHI M [Reprint author]; YASUTOMI K
CORPORATE SOURCE: DEP MED ENTOMOL, NATL INST HEALTH, SHINAGAWAKU, TOKYO, JPN
SOURCE: Journal of Medical Entomology, (1987) Vol. 24, No. 6, pp.
595-603.
CODEN: JMENA6. ISSN: 0022-2585.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 16 May 1988
Last Updated on STN: 16 May 1988

AB The Toyama strain of *Culex tritaeniorhynchus* Giles collected and colonized in Japan was highly resistant to organophosphorus insecticides. Resistance ratios were more than 125,000 for temephos, 6,000 for malathion, 26,500 for fenitrothion, and 22,929 for fenthion. Resistance was incompletely dominant over susceptibility. Insensitivity of acetylcholinesterase to the compounds was the major factor of resistance. The insensitivity index for paraoxon was 734 in comparison with a standard susceptible (Taiwan) strain. There was also evidence for detoxification by carboxylesterase. Two carboxylesterase genes and one gene coding a major molecular species of acetylcholinesterase were all located on chromosome II. These multiple enzymatic factors acted together, indicating a single gene for resistance on chromosome II, when the Toyama strain was crossed with susceptible marker mutants without recombination of the chromosome.

L43 ANSWER 86 OF 100 CAPLUS COPYRIGHT 2010 ACS on STN DUPLICATE 23

ACCESSION NUMBER: 1988:33495 CAPLUS Full-text
DOCUMENT NUMBER: 108:33495
ORIGINAL REFERENCE NO.: 108:5537a,5540a
TITLE: Microplate assay of acetylcholinesterase
inhibition kinetics in single-mosquito homogenates
AUTHOR(S): Brogdon, William G.; Barber, Ann M.
CORPORATE SOURCE: Div. Parasit. Dis., Cent. Dis. Control, Atlanta, GA,
30333, USA
SOURCE: Pesticide Biochemistry and Physiology (1987), 29(3),
252-9
CODEN: PCBPBS; ISSN: 0048-3575
DOCUMENT TYPE: Journal
LANGUAGE: English

AB The suitability of microplate assay methods for estimating the bimol. rate constant k_2 and I_{50} for inhibition of acetylcholinesterase was examined by selected organophosphates and carbamates in small portions of single-mosquito homogenates. Dilns. of homogenate up to 1:30 were used to measure these kinetic parameters. Absorbance values (or visual estns.) may be used to evaluate directly inhibitor potency in a particular assay. Practical values for these kinetic parameters may be rapidly and simply obtained using single concns. of substrate and inhibitor. Variability of inhibited enzyme activities was determined within a sample population of *Anopheles gambiae* using measurements from individual insects. The

kinetic treatment used in anal. of microplate assay data is discussed together with the potential role of this technique in studies of enzyme inhibition phenomena associated with insecticide resistance.

OS.CITING REF COUNT: 4 THERE ARE 4 CAPLUS RECORDS THAT CITE THIS RECORD
(4 CITINGS)

L43 ANSWER 87 OF 100 BIOSIS COPYRIGHT (c) 2010 The Thomson Corporation on
STN DUPLICATE 24

ACCESSION NUMBER: 1987:187587 BIOSIS Full-text
DOCUMENT NUMBER: PREV198783095711; BA83:95711
TITLE: THE DETECTION AND INTERACTION OF MULTIPLE
ORGANOPHOSPHORUS AND CARBAMATE
INSECTICIDE RESISTANCE GENES IN FIELD POPULATIONS OF
CULEX-PIPIENS FROM ITALY.
AUTHOR(S): VILLANI F [Reprint author]; HEMINGWAY J
CORPORATE SOURCE: LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE, KEPPEL ST
GOWER STREET, LONDON WC1E 7HT, ENGLAND, UK
SOURCE: Pesticide Biochemistry and Physiology, (1987) Vol. 27, No.
2, pp. 218-228.
CODEN: PCBPBS. ISSN: 0048-3575.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 20 Apr 1987
Last Updated on STN: 20 Apr 1987

AB Collection of field populations of *Culex pipiens* from Lucca, Italy, in 1984 and 1985 showed consistently high levels of resistance to a range of organophosphorus (OP) insecticides. Bioassays on the 1985 collection revealed that this population also had high levels of resistance of carbamates, even though these compounds had not been used in the field for *Culex* control. Biochemical analysis showed that the 1985 population contained the high esterase, Est-3A, and altered acetylcholinesterase (AChE) resistance mechanisms. The first OP resistance mechanism selected in Italian *Culex* was the Est-3A, and the AChE was then selected subsequently. Since September 1984 the altered AChE gene has been selected to a very high frequency in the Lucca population ($P = 0.98$), while there has been a significant decline in the frequency of the Est 3A gene from 0.70 to 0.36. The reason for these changes in gene frequency are considered.

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ACCESSION NUMBER: 1987:124514 BIOSIS Full-text
DOCUMENT NUMBER: PREV198783063575; BA83:63575
TITLE: IDENTIFICATION OF RESISTANCE MECHANISMS IN CULEX
-PIPIENS DIPTERA CULICIDAE FROM SOUTHERN FRANCE
INSENSITIVE ACETYLCHOLINESTERASE AND DETOXIFYING
OXIDASES.
AUTHOR(S): RAYMOND M [Reprint author]; FOURNIER D; BRIDE J-M; CUANY A;
BERGE J; MAGNIN M; PASTEUR N
CORPORATE SOURCE: INST SCI EVOLUTION, UNIV MONTPELLIER H, 34060 MONTPELLIER,
FR
SOURCE: Journal of Economic Entomology, (1986) Vol. 79, No. 6, pp.
1452-1458.
CODEN: JEENAI. ISSN: 0022-0493.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 7 Mar 1987
Last Updated on STN: 7 Mar 1987

AB Resistance mechanisms of a strain (MSE) of *Culex pipiens* L., collected in southern France in 1979 and high resistant to chlorpyrifos, were investigated by comparing the resistance characteristics to various organophosphates and carbamates in the absence or presence of synergists and determining the biochemical characteristics of four enzymes (esterases, glutathione-S-transferases, mixed function oxidases, and acetylcholinesterase) compared with a susceptible strain and a chlorpyrifos-resistant strain (S54) collected in the same area in 1960 and 1974, respectively. Chlorpyrifos resistance in S54 was due to a detoxifying esterase as previously described, whereas resistance in MSE was associated with an acetylcholinesterase insensitive to the inhibition by chlorpyrifoxon and some carbamates (propoxur, carbosulfan, and carbaryl), and with an increase of oxidative metabolism.

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ACCESSION NUMBER: 1987:104133 BIOSIS Full-text
DOCUMENT NUMBER: PREV198783053111; BA83:53111
TITLE: PESTICIDE RESISTANCE MECHANISMS PRODUCED BY FIELD SELECTION PRESSURES ON ANOPHELES-NIGERRIMUS AND ANOPHELES-CULICIFACIES IN SRI-LANKA.
AUTHOR(S): HEMINGWAY J [Reprint author]; JAYAWARDENA K G I; HERATH P R J
CORPORATE SOURCE: DEP ENTOMOL, LONDON SCH HYG TROP MED, KEPPEL ST, LONDON WC1E 7HT, ENGL, UK
SOURCE: Bulletin of the World Health Organization, (1986) Vol. 64, No. 5, pp. 753-758.
ISSN: 0042-9686.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 26 Feb 1987
Last Updated on STN: 26 Feb 1987

AB In Sri Lanka, *Anopheles nigerrimus* is resistant to a range of organophosphate and carbamate insecticides at both the larval and adult stages. Biochemical studies indicate that an alteration in acetylcholinesterase is the basis of resistance rather than increased metabolic breakdown of the insecticides. In contrast, *A. culicifacies* is resistant only to malathion and closely related compounds containing a carboxylate ester bond. Agricultural pesticides are the sole source of selection pressure for resistance in *A. nigerrimus*, while in *A. culicifacies* pressure arises predominantly from antimalaria spraying.

L43 ANSWER 90 OF 100 LIFESCI COPYRIGHT 2010 CSA on STN DUPLICATE 25

ACCESSION NUMBER: 86:81234 LIFESCI Full-text
TITLE: Field and laboratory detection of the altered acetylcholinesterase resistance genes which confer organophosphate and carbamate resistance in mosquitoes (Diptera: Culicidae).
AUTHOR: Hemingway, J.; Smith, C.; Jayawardena, K.G.I.; Herath, P.R.J.
CORPORATE SOURCE: Dep. Entomol., London Sch. Hyg. and Trop. Med., Keppel St., London WC1E 7HT, UK
SOURCE: BULL. ENTOMOL. RES., (1986) vol. 76, no. 4, pp. 559-565.
DOCUMENT TYPE: Journal
FILE SEGMENT: Z
LANGUAGE: English
SUMMARY LANGUAGE: English

AB A simple field method for direct detection of an altered acetylcholinesterase (AChE)-type organophosphate and carbamate resistance mechanism in individual

insects was developed. The test will allow accurate differentiation by eye, on the basis of a colour change, of homozygous-susceptible and heterozygous or homozygous-resistant individuals. In initial field trials of this test in Sri Lanka, *Anopheles nigerrimus* Giles and *Culex tritaeniorhynchus* Giles were shown to contain this type of resistance gene.

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ACCESSION NUMBER: 1986:146872 BIOSIS Full-text
DOCUMENT NUMBER: PREV198681057288; BA81:57288
TITLE: ROLE OF ESTERASES IN ORGANOPHOSPHORUS AND CARBAMATE RESISTANCE IN INDIAN STRAIN OF ANOPHELES-STEPHENSII.
AUTHOR(S): CHITRA S [Reprint author]; PILLAI M K K
CORPORATE SOURCE: DEPARTMENT OF ZOOLOGY, UNIVERSITY OF DELHI, DELHI 110 007, INDIA
SOURCE: Indian Journal of Experimental Biology, (1985) Vol. 23, No. 10, pp. 576-584.
CODEN: IJEBA6. ISSN: 0019-5189.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 25 Apr 1986
Last Updated on STN: 25 Apr 1986

AB Enzymatic activity of non-specific esterases and acetylcholinesterases of larvae, adult females and males of organophosphorus and carbamate-resistant strains of *A. stephensi* was compared to its susceptible counterpart. No significant correlation exists between the organophosphorus and carbamate-resistance and non-specific esterases. Enzyme kinetic studies of acetylcholinesterase of resistant and susceptible strains did not exhibit any difference suggesting that acetylcholinesterase insensitivity to OP-compounds and carbamates as a mechanism of resistance is not operating in *A. stephensi*. The results imply that other physiological mechanisms are responsible for the development of resistance in this strain of mosquitoes.

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ACCESSION NUMBER: 1985:424300 BIOSIS Full-text
DOCUMENT NUMBER: PREV198580094292; BA80:94292
TITLE: THE BIOCHEMISTRY OF INSECTICIDE RESISTANCE IN ANOPHELES-SACHAROWI COMPARATIVE STUDIES WITH A RANGE OF INSECTICIDE SUSCEPTIBLE AND RESISTANT ANOPHELES AND CULEX SPECIES.
AUTHOR(S): HEMINGWAY J [Reprint author]; MALCOLM C A; KISSOON K E; BODDINGTON R G; CURTIS C F; HILL N
CORPORATE SOURCE: DEP ENTOMOL, LONDON SCH HYGIENE TROPICAL MED, KEPPEL ST, LONDON WC1E 7HT, UK
SOURCE: Pesticide Biochemistry and Physiology, (1985) Vol. 24, No. 1, pp. 68-76.
CODEN: PCBPBS. ISSN: 0048-3575.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH

AB Fourth instar larvae, the progeny from wild-caught *A. sacharovi* females, were subjected to a number of biochemical tests and the results were compared to those from similar tests on laboratory insecticide resistant and susceptible strains of anopheline and culicine mosquitoes. DDT resistance in *A. sacharovi* is associated with the ability to rapidly metabolize DDT to DDE. The

organophosphorus and carbamate resistance was not associated with quantitative changes in esterases, multifunction oxidases, or glutathione S-transferase. The acetylcholinesterase was less sensitive to malaoxon and propoxur than laboratory susceptible *A. albimanus*, and plots of inhibition suggest that the population was polymorphic for > 1 form of acetylcholinesterase. Metabolism studies on malathion and pirimiphos methyl did not indicate resistance due to increased metabolism. There was no evidence of penetration barriers contributing to resistance to either DDT or malathion, and there was no indication of any resistance to pirimiphos methyl.

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ACCESSION NUMBER: 1985:314205 BIOSIS Full-text
DOCUMENT NUMBER: PREV198579094201; BA79:94201
TITLE: CARBAMATE AND ORGANOPHOSPHATE RESISTANCE IN
CULEX-PIPIENS DIPTERA CULICIDAE IN
SOUTHERN FRANCE AND THE SIGNIFICANCE OF EST-3A.
AUTHOR(S): WOOD R J [Reprint author]; PASTEUR N; SINEGRE G
CORPORATE SOURCE: DEP ZOOLOGY, MANCHESTER UNIV, MANCHESTER, UK
SOURCE: Bulletin of Entomological Research, (1984) Vol. 74, No. 4,
pp. 677-688.
CODEN: BERE2. ISSN: 0007-4853.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH

AB Three French strains of *C. pipiens* L. were compared at the 4th larval instar for tolerance to organophosphate and carbamate insecticides, with and without the addition of synergists (the oxidase inhibitors piperonyl butoxide) and CGA 84708 (a propynyl compound) and the carboxylesterase inhibitors triphenyl phosphate (TPP) and S,S,S-tributylphosphorotrithioate (TBPT). The S54 strain was resistant to all the organophosphates tested (chlorpyrifos, malathion, monocrotophos and profenofos) compared to the susceptible LA VIS strain, but only slightly tolerant to the 2 carbamates (carbaryl and naphthylphenylcarbamate). The MAURIN strain was resistant to all the insecticides, including the carbamates, at a higher level. The action of chlorpyrifos and malathion on S54 was very strongly synergized by TBPT, less strongly by TPP and not at all by piperonyl butoxide. In fact, resistance was enhanced by piperonyl butoxide, as was resistance to monocrotophos and profenofos by CGA 84708. No synergist had much effect on the MAURIN strain, although TPP slightly increased the toxicity of malathion, and piperonyl butoxide and CGA 84708 slightly increased the toxicity of carbaryl. The toxic effect of carbaryl also was increased by the addition of extra acetone. Electrophoretic studies showed that the carboxylesterase enzyme coded by gene Est-20.64 (which is in linkage disequilibrium with Est-3A and acts as a marker for it) was absent from LA VIS but present in the resistant strains; but, whereas S54 was monomorphic for the gene, MAURIN was polymorphic (frequency 0.5). Thus organophosphate resistance in S54 was due to detoxification by carboxylesterase whereas organophosphate and carbamate resistance in MAURIN had a strong non-metabolic component, possibly an insensitive acetylcholinesterase.

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ACCESSION NUMBER: 1985:305096 BIOSIS Full-text
DOCUMENT NUMBER: PREV198579085092; BA79:85092
TITLE: THE INACTIVATION OF ACETYLCHOLINESTERASE
EC-3.1.1.7 BY ALPHA TERTHIENYL AND UV LIGHT STUDIES
IN-VITRO AND IN LARVAE OF THE MOSQUITO AEDES

-AEGYPTI.
AUTHOR(S): KAGAN J [Reprint author]; HASSON M; GRYNSPAN F
CORPORATE SOURCE: DEP CHEM, UNIV ILL CHIC, BOX 4348, CHICAGO, ILL 60680, USA
SOURCE: Biochimica et Biophysica Acta, (1984) Vol. 802, No. 3, pp. 442-447.
CODEN: BBACAQ. ISSN: 0006-3002.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH

AB Acetylcholinesterase was inactivated photochemically in solution, in the presence of dissolved terthiophene sensitizers. Alpha-terthienyl (2,2':5,2''-terthiophene) and its isomers 3,2':5,2''- and 3,2':5,2',3''-terthiophenes showed very similar sensitizing properties. With all 3 terthiophenes, the photosensitization was completely suppressed under anaerobic conditions, and therefore the inactivation process required the presence of O₂. The enzyme was inactivated in vivo when fourth instar larvae of the mosquito *Aedes aegypti* were treated with α -terthienyl in the presence of long-wavelength UV light. No inactivation was observed when the organisms were treated with the UV light alone, with the chemical alone, or with a previously irradiated sample of the chemical. This paper represents the first example of acetylcholinesterase inactivation in vivo by a photoactive insecticide.

L43 ANSWER 95 OF 100 CAPLUS COPYRIGHT 2010 ACS on STN DUPLICATE 26

ACCESSION NUMBER: 1983:156373 CAPLUS Full-text
DOCUMENT NUMBER: 98:156373
ORIGINAL REFERENCE NO.: 98:23665a,23668a
TITLE: Studies on the acetylcholinesterase of
Anopheles albimanus resistant and susceptible
to organophosphate and carbamate
insecticides

AUTHOR(S): Hemingway, Janet; Georghiou, George P.
CORPORATE SOURCE: Dep. Entomol., Univ. California, Riverside, CA, 92521,
USA

SOURCE: Pesticide Biochemistry and Physiology (1983), 19(2),
167-71
CODEN: PCBPBS; ISSN: 0048-3575

DOCUMENT TYPE: Journal
LANGUAGE: English

AB acetylcholinesterase [9000-81-1] From fourth instar *A. albimanus* larvae was studied in vitro. The acetylcholinesterase from both the resistant and susceptible strains behaved as a single enzyme "type", with straight pseudo-1st-order insecticide inhibition lines which intersected the Y axis at 100%. The enzyme from resistant larvae was more slowly inhibited than the susceptible enzyme; bimol. rate consts. (k_i differed by approx. 1.2- to 6-fold for a range of organophosphorus compds. and 17- to 1570-fold for the carbamates. There was a good correlation between the levels of resistance and the acetylcholinesterase inhibition rates.

OS.CITING REF COUNT: 21 THERE ARE 21 CAPLUS RECORDS THAT CITE THIS
RECORD (21 CITINGS)

L43 ANSWER 96 OF 100 CAPLUS COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 1982:47511 CAPLUS Full-text
DOCUMENT NUMBER: 96:47511
ORIGINAL REFERENCE NO.: 96:7751a,7754a
TITLE: Taxonomy-related cholinesterase inhibition patterns in
insects

AUTHOR(S): Voss, G.
CORPORATE SOURCE: Agric. Div., Ciba Geigy Ltd., Basel, 4002, Switz.
SOURCE: Journal of Economic Entomology (1981), 74(5), 555-7
CODEN: JEENAI; ISSN: 0022-0493

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The sensitivity of 26 insect acetylcholinesterase [9000-81-1] enzymes to fixed concns. of 7 carbamate and organophosphate inhibitors were comparatively evaluated in an automated enzyme assay. Closely related species exhibited identical or very similar inhibition patterns, whereas species from different orders could be distinguished from each other on the basis of their relative inhibitor sensitivities. Thus, cholinesterase inhibition patterns in insects are related to taxonomy.

OS.CITING REF COUNT: 4 THERE ARE 4 CAPLUS RECORDS THAT CITE THIS RECORD
(4 CITINGS)

L43 ANSWER 97 OF 100 CAPLUS COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 1977:117878 CAPLUS Full-text

DOCUMENT NUMBER: 86:117878

ORIGINAL REFERENCE NO.: 86:18617a,18620a

TITLE: Histochemistry of esterases of the nervous system of some insects of the Diptera order in relation to the effect of insecticides

AUTHOR(S): Tertyshnyi, V. N.; Petrenko, V. S.

CORPORATE SOURCE: Inst. Org. Khim., Kiev, USSR

SOURCE: Fiziologicheskii Aktivnye Veshchestva (1976), 8, 25-9
CODEN: FAVUAI; ISSN: 0533-1153

DOCUMENT TYPE: Journal

LANGUAGE: Russian

AB Acetylcholinesterase (I, EC 3.1.1.7), carboxyl esterase (II, EC 3.1.1.1), and aryl esterase (III, EC 3.1.1.2) were histochem. localized in the central nervous systems of the larvae and imago of the common housefly (*Musca domestica*), the house mosquito *Culex pipiens molestus*, and the blood-sucking gnat (*Schoenbaueria matthiesseni*). In the thoracoabdominal complex of the housefly larva and in the metathoracic ganglia of the other 2 larvae, very high I activity was observed in the neuropil and moderate activity was observed in the bodies of the neurons and glial cells. The entire neuropil regions were evenly stained for I activity, whereas the stained regions in the neuron and glial cell bodies were in the form of syncytia. The neurophil regions of the *C. pipiens molestus* and housefly larvae were more intensely stained than those of the *S. matthiesseni* larva. The metathoracic ganglia in the imago of all 3 species were centrally stained for I, II, and III activities. In the brains of these 3 species, I was localized in the peripheral brain structures, whereas II and III were localized in the central brain structures. Again, most of the I activity was located in the neuropil of the above regions. The interaction of organophosphorus insecticides with these enzymes is discussed.

L43 ANSWER 98 OF 100 CAPLUS COPYRIGHT 2010 ACS on STN

ACCESSION NUMBER: 1974:486713 CAPLUS Full-text

DOCUMENT NUMBER: 81:86713

ORIGINAL REFERENCE NO.: 81:13747a,13750a

TITLE: Carbamate insecticide selectivity. I.
Evaluation of potential selectophores

AUTHOR(S): Sanborn, James R.; Lee, An-Horng; Metcalf, Robert L.

CORPORATE SOURCE: Dep. Entomol., Univ. Illinois, Urbana, IL, USA

SOURCE: Pesticide Biochemistry and Physiology (1974), 4(1),
67-76

CODEN: PCBPBS; ISSN: 0048-3575

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The introduction of potentially selective functional groups did not improve the unfavorable mouse to housefly toxicity ratios of Ph N-methylcarbamates I.

The toxicity of I [R = SCH₂CN, SCHMeCN, SCH₂CO₂Et, SCH₂CONMe₂, CN, CH:NOCONHMe, H, etc., R₁ = H, CN, CH:C(CN)₂, or CH:NOCONHMe, and R₂ = H or CN] was detd.on housefly (*Musca domestica*), *Phormia regina*, *Culex* and mouse. In addition, the anticholinesterase activity of I was determined for purified housefly head and bovine erythrocyte acetylcholinesterase [9000-81-1]. O-N-methylcarbamoyloxyiminomethylphenyl N-methylcarbamate (I, R = CH:NOCONHMe, R₁ = R₂ = H) [34646-90-7] had a very high toxicity to the mouse, due probably to a mechanism involving Beckmann rearrangement. Pretreatment of the housefly with piperonyl butoxide [51-03-6] increased the toxicity of I very markedly.

L43 ANSWER 99 OF 100 MEDLINE on STN DUPLICATE 27
 ACCESSION NUMBER: 1973014902 MEDLINE Full-text
 DOCUMENT NUMBER: PubMed ID: 5076351
 TITLE: Inhibition of acetylcholinesterase from mammals and insects by carbofuran and its related compounds and their toxicities toward these animals.
 AUTHOR: Yu C C; Metcalf R L; Booth G M
 SOURCE: Journal of agricultural and food chemistry, (1972 Sep-Oct) Vol. 20, No. 5, pp. 923-6.
 Journal code: 0374755. ISSN: 0021-8561. L-ISSN: 0021-8561.
 PUB. COUNTRY: United States
 DOCUMENT TYPE: Journal; Article; (JOURNAL ARTICLE)
 LANGUAGE: English
 FILE SEGMENT: Priority Journals
 ENTRY MONTH: 197212
 ENTRY DATE: Entered STN: 10 Mar 1990
 Last Updated on STN: 10 Mar 1990
 Entered Medline: 1 Dec 1972

L43 ANSWER 100 OF 100 CAPLUS COPYRIGHT 2010 ACS on STN
 ACCESSION NUMBER: 1973:428349 CAPLUS Full-text
 DOCUMENT NUMBER: 79:28349
 ORIGINAL REFERENCE NO.: 79:4573a,4576a
 TITLE: Antiesterase activity of some alkylurethanephosphoric acid derivatives on insects in vivo
 AUTHOR(S): Petrenko, V. S.; Odintsov, V. S.
 CORPORATE SOURCE: Inst. Org. Khim., Kiev, USSR
 SOURCE: Fiziologicheskii Aktivnye Veshchestva (1966-1992) (1972), No. 4, 22-4
 CODEN: FAVUAI; ISSN: 0533-1153
 DOCUMENT TYPE: Journal
 LANGUAGE: Russian

AB Avenin [6309-98-4], demuphos [2231-31-4], methyl demuphos [28227-07-8], or thioavenin [23505-16-0] inhibited the activities of acetylcholinesterase [9000-81-1] and arylesterase [9032-73-9] only by 15-30% when applied to *Musca domestica*, *Culex pipiens*, and *Schoenbaueria mattiesseni* at doses corresponding to the LD₅₀ values. Inhibition of carboxylesterase [9016-18-6] activity ranged between 36 and 91%, with demuphos showing the strongest inhibiting effect. No significant differences were observed among the species in their response to the tested preps.

=> LOG Y